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Ownership, Intangible Assets and Joint Ventures' Performance: the Case with American Firms' International Joint Ventures in Japan

By

Lifeng Geng

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Doctor of Philosophy

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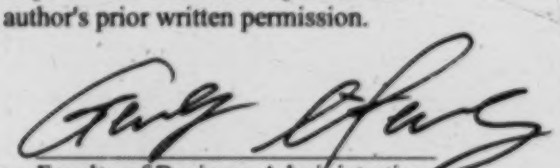

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research for acceptance, a thesis entitled *Ownership, Intangible Assets and Joint Ventures' Performance: the Case with American Firms' International Joint Ventures in Japan* submitted by Lifeng Geng in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Organizational Analysis.

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Abstract

International joint venture (IJV) is one popular form of foreign direct investment (FDI). To date, the state of research in IJV performance has been plagued by confusing concepts, a lack of sound theoretical foundation, and the misinterpretation of transaction cost theory. Consequently, this type of research has generated inconclusive and often conflicting result. It is within this context that this thesis intends to build a theoretical model for international joint ventures' performance.

At the center of this thesis, I propose that there is an interaction effect between parent firms intangible assets and parent firms' share of ownership on joint ventures' performance.

This thesis proceeds in three phases. In phase one, key concepts like IJV control and IJV performance are defined and a theoretical model is introduced. In phase two, exploratory factor analysis is conducted to reveal the distinct dimensions behind multiple indicators of joint ventures' performance. In the third phase, the distinct dimensions of joint ventures' performance are used as dependent variable in the regression analysis.

The contribution of this research is three-fold. First, it clarified some key concepts such as IJV control and IJV performance. Second, drawing on resource-based theory and transaction cost theory, it introduced a theoretical model for IJV performance. Compared to previous research that focus on the bivariate relationship between parent firms' share of ownership and IJV performance, this model proposes

that there is an interaction effect between parent firms intangible assets and parent firms' share of ownership on IJV performance. The findings provide partial support for the interaction effects. Third, this study has important implications to practitioners. The study suggests that a large share of ownership may not warrantee superior performance. Actually, our findings indicate that parent firms with a low level of intangible assets and a large share of ownership may cause inferior joint ventures' performance. In order to achieve better performance, foreign investing firms need to make strategic decisions based on their level of intangible assets.

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Chapter I

Introduction

Foreign Direct Investment (FDI) plays a prominent role in the world economy (United Nations, 1994). In the past two decades, the level of FDI has increased by approximately 750 percent. It rose from 524 billion US dollars in 1980 to 4.1 trillion US dollars in 1998. This growth rate is approximately three times higher than that of the world trade (UNCTAD, 1999). This momentum has endured and appears to be irreversible (United Nations, 1994).

The international joint venture (IJV) is a popular form of FDI (Hennart, 1988; Geringer, 1991). The IJV allows a firm to avoid making early commitment to technologies, products or markets that may later prove to be of little commercial value, and thus it provides an effective means for coping with the increasing costs and risks involved in innovation and technological development (Hamilton, 1985; Roberts & Mizouchi, 1989). The IJV can also be used to bring knowledge and resources together (Porter & Fuller, 1988). When a firm cannot obtain or rely on its own resources, distribution networks or economies of scale to compete and exploit its firm specific advantage and proprietary assets on a global scale, the IJV make this possible by allowing it to join its resources and capabilities with the other firm's resources and capabilities (Rosenbloom & Cusumano, 1987; Ohmae, 1989). On the other hand, the IJV also poses risks. Inherently, the presence of two or more parent firms is a potential source of complexity and conflict. Differences in national/organizational cultures, differences in strategic objectives, and differences in organizational structures, processes and systems may cause considerable amount of complexity and conflict. These complexities and conflicts make the IJV difficult and laborious to manage and this may hurt the IJV's performance (Janger, 1980; Killing, 1983; Geringer, 1988; Kogut, 1988). More importantly, by going into partnership with the other firm, a firm may run the risk of giving away its critical resources or capabilities to its potential competitor.

The risks of losing the firm's critical resources and capabilities make it essential for a firm to acquire a certain level of control (Hennart, 1988). Previous research suggests that the level of control a firm exerts over its IJV is a crucial factor for protecting the firm's proprietary assets and core competencies and that ensures the IJV be managed in ways that are consistent with the parent firm's interests and objectives (Tanebaum, 1968; Stopford & Wells, 1972; Lorange et al., 1974; Schaan, 1983; Baliga & Jaeger, 1984; Lorange & Morton, 1986; Hennart, 1988). According to previous research, the level of control a firm exercises over its IJV is a critical determinant of the IJV's performance (Rafii, 1978; Killing, 1983; Schaan, 1983; Beamish, 1984; Geringer & Hebert, 1989). In fact, Beamish (1984) suggested that control is the most common variable discussed in conjunction with performance in the IJV literature.

Yet, the exercise of control in the IJV can prove to be both critical and complex. Managers attempting to discern how control should be divided between the parent firms will receive limited assistance from the literature. Empirical evidence regarding the nature and the strength of the relationship between control and the IJV's performance is also limited. Relevant research exhibits extensive fragmentation and confusion that constrains its comparability and generalizability. The results of research are often contradictory and inconclusive (Parkhe, 1993; Liouville & Nanopoulos, 1996; Osland & Cavusgil, 1996).

Further, to date, only a few researchers have studied the relationship between control and IJV performance and our understanding of this issue remains limited (Nitsch et al., 1996; Tallman & Li, 1996; Osland & Cavusgil, 1996). One explanation for this apparent lack of effort is that data on IJV performance are difficult to obtain. Differing national financial reporting conventions, reluctance of the parent firm to disclose non-consolidated data and the difficulties associated with reconciling internal data from different firms served as barriers to this type of research. Finally, researchers often view the concept of IJV performance as an ambiguous and controversial

construct that is difficult to measure and operationalize, and this perception seriously hinders the progress in IJV performance research. (Anderson, 1990).

It is within this context of scant evidence and extensive fragmentation that this research intends to study the relationship between control and IJV performance. The remainder of this study is divided into 8 chapters:

Chapter 2 presents a review of the literature on IJV performance. Special emphasis is placed on the concepts of control, IJV performance and the control-performance relationship.

Chapter 3 presents a conceptual model for the control-IJV performance relationship by drawing from both the resource-based theory and transaction cost theory. It clarifies the interactions between ownership and complementary resources in affecting IJV performance. Based on this model, a set of hypotheses is formulated.

Chapter 4 discusses the influences of country factor, industry factor, firm size, IJV age, localization, and industry relatedness on IJV performance.

Chapter 5 outlines the research methodology. The sampling frame and variable operationalization are discussed.

Chapter 6 reports sample characteristics and descriptive statistics.

Chapter 7 reports the results of several exploratory analyses. They include factor analysis, ANOVA, MANOVA, discriminant analysis, and cluster analysis.

Chapter 8 reports results of the regression analyses.

Finally, Chapter 9 discusses the results on hypotheses testing. It also elaborates the limitations of this study and points to potential avenues for future research.

Chapter II

Control and IJV Performance: A Literature Review

The literature related to IJV performance can be classified into six major categories, namely,

1. The dimensions of IJV control (e.g. Friedman & Beguin, 1971; Williamson, 1975; Killing, 1982; Schaan, 1983; Geringer & Hebert, 1992; Yan & Gary, 1994);

2. The concept of IJV performance (e.g. Killing, 1983; Geringer & Herbert, 1986; Blodgett, 1987; Anderson, 1990);

3. Motivations for the formation of IJV (e.g. Berg et al., 1982; Porter & Fuller, 1988; Rosenbloom & Cusumano, 1987);

4. Entry mode research (e.g. Dunning, 1977; Anderson & Gatignon, 1986; Kogut & Singh, 1988; Kim & Huang, 1992);

5. The impacts of control on IJV performance (e.g. Tomlinson, 1977; Killing, 1982; Beamish, 1984; Geringer & Hebert, 1989; Tillman, 1990; Makino, 1995);

6. Other determinants of IJV performance (Killing, 1982; Beamish, 1988; Harrigan, 1988; Koh & Venkatraman, 1991).

We devote most of our review to articles in the first, second and fifth categories since the control-IJV performance relationship is the focal point we intend to investigate. However, we will briefly review some entry mode studies. These studies suggest that some entry modes associated with certain degrees of control tend to be more efficient, and thus may shed light on the control-IJV performance relationship. We review these literatures in turn.

2.1 The Concept of Control

Conceptually, control may be viewed as the processes through which one entity influences the behavior and output of another entity (Ouchi, 1977). These processes

are typically accompanied with the use of a wide range of power-based, bureaucratic, cultural or informal mechanisms (Etzioni, 1965; Baliga & Jaeger, 1984). Control plays an important role in the firm's capacity to achieve its goals. As the organization expands in size and scope, there emerge concurrent increases in the complexity and differentiation of its structure (Lawrence & Lorsch, 1967). The possibilities of domain conflicts and competing goals between units increase correspondingly. Consequently, top management is confronted with an increasing need to monitor, to coordinate, and to integrate the activities of different business units (Child, 1977; Mintzberg, 1979).

The importance of control can also be interpreted within the framework of transaction cost analysis (TCA). According to TCA, transaction costs are the costs assumed by the firm for the enforcement, monitoring and administration of transactions (Williamson, 1975). Depending on the characteristics of transactions, the firm tends to choose structural transaction arrangements that minimize these costs. In the case of the IJV, unintended disclosure of proprietary assets may happen, conflicts may emerge between a firm and its partners, and the firm may find it necessary to coordinate the IJV's activities (Anderson & Gatignon, 1986). These conflicts, coordination and unintended disclosure of proprietary assets may generate transaction costs associated principally with uncertainty, opportunistic behavior and asset-specificity (Williamson, 1975; Ouchi, 1977) that limit the potential gains of the IJV (Beamish & Banks, 1987; Buckley & Casson, 1988). Viewed from this perspective, a certain level of control is a mechanism that can be used to reduce the risks associated with coordination, conflicts and unintended disclosures of proprietary assets (Anderson & Gatignon, 1986; Hennart, 1988). An appropriate level of control may minimize transaction costs and improve the IJV's performance (Geringer & Hebert, 1989).

The importance of control in the capacity of the organization to achieve its goals and to reduce transaction costs explains why so many scholars devoted their attention to its role in IJV activity (e.g. Skinner, 1968; Franko, 1971; Stopford &

Wells, 1972; Brooke & Remmers, 1978; Cray, 1984; Anderson & Gatignon, 1986; Bartlett & Ghoshal, 1989). After many years of study, scholars reveal that the concept of control is a multidimensional construct. It can be analyzed in terms of the mechanisms of control, the focus of control and the extent of control (Geringer & Hebert, 1989).

2.1.1 The Mechanisms of Control

The first dimension of IJV control is the mechanism through which the firm exercises control. Initial studies on the multinational corporation's (MNC) strategies and structures associate control with the MNC's share of ownership (Tomlinson, 1970; Franko, 1971; Stopford and Wells, 1972). These studies suggest that the MNC frequently relies on majority ownership to achieve effective control over the activities of its overseas subsidiaries. Subsequent research notices that IJV control was not a strict and automatic consequence of ownership and the firm may exercise effective control by means of other mechanisms (Friedman & Beguin, 1971; Schaan, 1983). For instance, Friedman and Beguin (1971) studied the IJV in less developed countries (LDCs). They found that a number of factors made the degree of control to deviate from equity holdings. Their findings indicated that the firm could use the rights of veto, or other special agreements such as licensing and management contracts to exercise effective control. The firm could also use its technical superiority and managerial skill to guarantee its participation in the day-to-day operation of the IJV. Behrman (1970) studied American MNCs with operations in developed countries such as Canada, Europe and Australia. He suggested that control could be achieved through staffing, especially, by the appointments of the IJV's board of directors and key management positions. Gullander (1976) found that both the control over raw materials and ownership structures could serve as effective means of IJV control.

Schaan (1983) is the first author who systematically studied different mechanisms of IJV control. In his study of ten joint ventures in Mexico, Schaan revealed that IJV control could be achieved by formal mechanisms such as formal agreements, the appointment of the IJV's board of directors and key personnel, the IJV's planning process, the reporting relationships, and by a number of other informal mechanisms. Schaan made an important contribution by revealing two main categories of IJV control mechanisms. He suggested that there were both positive and negative mechanisms of control. Positive control mechanisms promote certain behaviors while negative control mechanisms stop or prevent the IJV from pursuing certain activities or decisions. Positive control is often exercised through informal mechanisms, staffing, planning processes and by reporting relationships. In contrast, negative control relies heavily on formal agreements and the appointment of the IJV's board of directors.

2.1.2 The Extent of Control

Research on the extent of control consists of two groups of studies. The first group of studies borrows heavily from organizational research and tends to conceptualize the extent of control as the degree of centralization in the decision making process. The second group of studies focuses on the determinants of the extent of control.

One example of the first type of research is Dang's (1977) study of the American MNC's subsidiaries in the Philippines and in Taiwan. He defined the extent of control as the degree of autonomy enjoyed by the MNC's subsidiaries. The degree of autonomy in turn was measured by a decentralization index that is based on 17 key decision items. In his study, nonparametric tests failed to reveal any difference in the extent of control among different ownership forms. Therefore, Dang concluded that the degree of the MNC's control over its subsidiaries could not be explained by its

share of ownership and the wholly owned subsidiary was not more tightly controlled than the IJV. This conclusion is problematic since the MNC's control over its subsidiaries might not be fully captured by Dang's decentralization index.

Killing (1982) studied 37 IJVs in developed countries. Building on the work of Tomlinson (1970), Killing examined the parent firm's influence on nine types of decisions by interviewing executives from both the parent firm and the IJV. He proposed a classification of the IJV based on the extent and the symmetry of the parent firm's control. He discriminated the dominant controlled IJV (where decisions are dominated by one parent firm) from the independent IJV (where the IJV's general managers enjoy extensive autonomy) and the shared IJV (where each parent plays an active role in the IJV's decision making). Several studies used similar methods or related to the methods introduced by Killing. For instance, Geringer (1991) studied 90 US-based IJVs. He evaluated the degree of control along nine dimensions similar to those used by Killing (1982). He extended Killing's (1982) work by explicitly differentiating the division of control among parent firms from the division of decision-making between the parents and the IJV. Similar approaches can also be found in Hill (1988), Blumenthal (1988) and Tillman (1990).

The second group of studies tends to view the extent of control as the result of a negotiation process that reflects each partner's relative bargaining power. For instance, Lecraw (1984) indicated that the MNC's bargaining power, its degree of control over overseas subsidiaries and its equity position were significantly correlated. Fagre and Wells (1982) found that the MNC's equity position was related to its bargaining power. Its bargaining power in turn was determined both by the type of resources it provided and by the availability of these resources from other sources. Blodgett (1987, 1991) suggested that the firm's bargaining power is determined by its ability to protect its resource base in such a way that its partner could not acquire or absorb these resources. She proposed that resources such as technology and the knowledge of market access provide dominant bargaining power. The empirical

testing she conducted on a sample of 69 IJVs showed that the parent firm with such resources typically obtained the majority equity position (Blodgett, 1991).

2.1.3 The Focus of Control

The research we reviewed so far implicitly assumes that the firm seeks to control every aspect of the IJV's decision making. Some authors suggest that this may not always be the case. A number of studies show that the firm can achieve effective control by focusing on some specific activities or areas of the IJV's decision making (Beamish, 1988; Killing, 1988). For example, Schaan (1983) found that the firm might choose to exercise control over some strategically important activities. Geringer (1991) supported this contention and noticed that although most IJVs in his sample split equity on a 50/50 basis, control over some specific IJV activities was not often shared as equally as ownership. In particular, control over decision areas such as capital expenditure, hiring of IJV managers and the establishment of price and sales targets tended to be more shared than did control over IJV activities such as product design, manufacturing set-up and the day-to-day management. This phenomenon is also evident in Awadzi's (1987) study.

Nevertheless, to date, little is known about the nature and the types of focus control. No specific rule is established to distinguish the focus control structures from the other types of control structures. In the absence of a precise indicator of focus control structure, it is difficult to determine whether an IJV, in which one parent dominates one activity and other decisions are shared, should be described as a shared control IJV or as a focused one.

2.2 IJV Performance

The concept of IJV performance has been conceptualized and operationalized in many different ways. No consensus on the appropriate definition and measurement of this construct has yet emerged (Anderson, 1990; Geringer & Hebert, 1991). Some authors use a variety of financial indicators typically employed in business research such as profitability, growth and cost position (Tomlinson, 1970; Good, 1972; Dang, 1977; Lecraw, 1983). Others use objective measures such as the IJV's survival (Franko 1971; Stopford & Wells, 1972; Killing, 1983; Geringer, 1991), duration (Harrigan, 1986; Kogut, 1988), instability, significant changes in ownership structure (Franko, 1971; Gomes-Casseres 1987), and renegotiations of the IJV's contract (Blodgett, 1987). One critique of these measures is that they may embody potential limitations that are critical to the evaluation of IJV performance. Some authors suggest that the IJV may be formed to pursue a number of objectives such as technology transfer, joint research, or access to materials, access to new markets or access to scale economies (Contractor & Lorange, 1988; Porter & Fuller, 1988). In such situations, financial or objective measures may not accurately reflect the IJV's performance (Anderson, 1990). They may fail to adequately reflect the extent to which the IJV has achieved its short and long-term objectives (Killing, 1983; Artisien & Buckley, 1985; Blodgett, 1987). As Anderson (1990) suggested, the financial measures only evaluate one dimension of the IJV's performance. Other factors, including qualitative ones must also be examined. It was argued that despite the poor financial results, liquidation or instability, the IJV may meet or exceed the parent firm's objectives and thus be considered as successful. Conversely, the IJV may be viewed as unsuccessful despite its good financial results and continued stability.

With these concerns, a number of researchers rely on the management's perceptual assessments to evaluate IJV performance (e.g. Killing, 1982; Schaan, 1983; Beamish, 1984; Hill, 1988; Geringer & Hebert, 1991). They typically collect data on

the parent firm's level of satisfaction with the IJV. It is claimed that this approach measures the parent firm's mutual satisfaction with the IJV and provides an opportunity to account for potential divergence among the partner firm's evaluations of IJV performance. Further, the use of multiple respondents also reduces the biases associated with a single-respondent/source, which is typical in the literature (Tomlinson, 1970; Lecraw, 1984; Awadzi, 1987; Kogut, 1988).

Perceptual measures of IJV performance are also claimed to have many other advantages over objective measures. They have the ability to incorporate a variety of goals pursued by the parent firm. They resolve the problem of comparability across different types of IJVs, across different industries and across different countries (Hill, 1988). They also permit the incorporation of both qualitative and quantitative measure of performance. This is of special importance for evaluating the IJV in risky, uncertain or little understood markets or technologies (Lynch, 1989; Anderson, 1990).

However, perceptual measures of IJV performance also entail problems. One of the most frequently used perceptual measures is the parent firm's satisfaction. Nevertheless, satisfaction is not a concept equivalent to the concept of performance. By definition, satisfaction refers to the positive affective state resulting from the appraisal of one or many aspects of an event (Beamish, 1984). It is not the direct assessment of the extent to which the IJV has achieved the parent firm's objectives. Although the achievement of the parent firm's objectives may be reflected in, or be related to the parent firm's satisfaction (Beamish, 1984), satisfaction may also be the result of other aspects of the IJV's activity. For example, satisfaction can be expressed in terms of the performance of the IJV's general managers (Geringer & Frayne, 1993), could be the result of the parent firm's good relationships, or could be the result of the parent firm's ownership positions (Blodgett, 1991). Some authors even observe that perceptual measures of IJV performance may not measure IJV performance at all. Instead, they may reflect some psychological or cultural artifacts. For instance, Osland

& Cavusgil (1996) found that dissatisfaction with the IJV could be the manifestations of the lack of control.

In addressing the limitations of both perceptual and objective measures of IJV performance, there is a trend toward the use of composite measures of IJV performance. For instance, Awadzi (1987) uses a composite measure which includes some financial indicators, a 13-item scale that measures the extent to which the parent firm's expectations are met and a 14-item scale that measures the IJV's performance relative to other firms in the same industry. Subieta (1991) combines the IJV's duration with a scale that measures the IJV's achievement of its parent firm's objectives, and a scale that measures the parent firm's satisfaction. Blumenthal (1988) assesses the IJV's performance along nine dimensions and uses one measure to evaluate the parent firm's overall satisfaction. Hill (1988) uses an indicator for the parent firm's overall satisfaction and a perceptual assessment of the IJV's financial performance. Roos' (1989) measures include a financial performance indicator, a perceptual multi-item scale that assessed the parent firm's overall satisfaction and an indicator that reflects the relationship between the parent firms.

2.3 Entry Mode Research

The major premise of the entry mode research is that under certain conditions, some entry modes are selected because they are more efficient. This implies that under given settings, selecting appropriate entry modes will lead to higher levels of performance. The theoretical basis of the entry mode research is TCA (Williamson, 1975). This theory suggests that the firm engages in FDI because it can capitalize on its intangible assets by pursuing international expansion (Dunning 1977). The firm's intangible asset is knowledge based and is reflected by its experience, skill and ability (Agarwal & Ramaswami, 1992). It is often operationalized as the firm' R & D

intensity, advertising intensity and international experience (Agarwal & Ramaswami, 1992, Caves & Mehra, 1986, Kogut & Singh 1986, Kogut & Zander, 1993).

When the firm plans to set up operations in a foreign country, it will face two major problems. One problem is associated with the lack of a well-developed market for knowledge-based intangible assets (Williamson, 1996). The second is that, because of information asymmetry, its potential partner has both the incentive and the opportunity to shirk (Williamson, 1975; Hennart, 1988). If it shares its knowledge with its partner, its partner may acquire the knowledge and operate separate entities at a future date. Thus, the firm runs the risk of losing its intangible assets and long-term revenues. This risk is especially relevant for international transactions since interorganizational infrastructures are often poorly developed and are more likely to change across national boundaries (Ring & Van de Ven, 1992). Therefore, the owner of knowledge-based intangible assets must deal with the local partner's opportunistic behavior and choose structural transaction arrangements that minimize these risks (Williamson, 1975; Ouchi, 1977; Anderson & Gatignon, 1987). The more intangible assets are at stake, the more the control and the larger the shares of ownership the firm need to acquire in order to protect its intangible assets and long-term profit. In this way, the firm's amount of intangible assets will determine its mode of entry (Geringer & Hebert, 1989). Empirical studies show that when the firm possesses more intangible assets, entry modes associated with higher levels of control are used (Stopford & Wells, 1972; Caves, 1982; Davidson, 1982; Coughlan & Flaherty, 1983; Coughlan, 1985; Hennart, 1988; Kogut & Singh, 1988; Kogut & Zander, 1993).

2.4 Control-Performance Research

In the control-performance research, the concept of control has been operationalized in many different ways. Early studies often use concepts that are not directly linked to the concept of control. For instance, Tomlinson (1970) used the

parent firm's "attitudes toward control" as a proxy for control. From a non-random sample of 71 British IJVs in India and Pakistan, Tomlinson found that the IJV achieved higher levels of profitability when its British parent assumed a more relaxed attitude towards control. However, the validity of this conclusion is questionable since Tomlinson used return on investment as a measure of IJV performance. Such a measure is inadequate for a multi-industry study and may produce unreliable results. Variations in the financial performance of the IJV could be caused, for example, by industry differences, rather than by differences in the attitude toward control. Furthermore, as noted by Geringer (1988), Tomlinson's results may not be generalized to the IJV in developed country since his sample only included IJVs from India and Pakistan.

Franko (1971) used the parent firm's strategy as a contingency variable for the control-performance relationship. Using a sample of 169 US MNCs involved in more than 1100 developed and less developed country IJVs, Franko examined the relationship between the parent firm's control and the IJV's stability across different types of MNC strategy. His main finding was that different strategies had different organizational and control requirements. The IJV was more stable when the parent firm followed a diversification strategy that demands less control over subsidiaries. In contrast, the IJV evidenced greater instability when its parent firm's strategy emphasized product concentration that relies on centralized decision-making and strong control.

Franko's study also embodies serious limitations. First, Franko relied on the MNC manager's ratings of the importance of standardization and centralization of decision making to measure the extent of control. These measures may not reflect the MNC's control at all. Second, he used changes in the IJV's ownership structure as the measure of IJV performance. This might be a poor indicator of IJV performance since ownership itself is one mechanism of control. Using this construct may cause confusion regarding the meaning of ownership changes.

Later control-performance studies tend to investigate the relationship between the overall division of control and IJV performance. Among these studies, Killing's (1982) study constitutes the starting point. Killing (1982) asserted that among three IJV categories, the dominant controlled IJV was more likely to be successful than the shared IJV. His argument was that the presence of two (or more) parents constituted the major source of management difficulties in the IJV. The dominant controlled IJV, in which a single firm dominated the venture's activities, would be easier to manage and tended to be more successful. To test this hypothesis, Killing measured performance with the management's perceptual assessment and by the IJV's liquidation (or the IJV's reorganization). With a sample of 37 IJVs, Killing found that compared to the shared IJV, both dominant controlled IJV and the independent IJV tended to be more successful on both indicators of performance.

Beamish applied Killing's measures of control and performance on a nonrandom sample of 12 IJVs in less-developed countries (LDCs). Unsatisfactory performance was found to be correlated with dominant foreign control. Dominant control by the LDC partner and shared control were judged unsatisfactory only in a few cases. Further analysis showed that dominant foreign control in production scheduling, production process, quality control and replacement of managers was significantly associated with unsatisfactory performance. Jaeger (1980) used a classification schema similar to Killing's and he studied a sample of 168 IJVs. His result indicated that no control structure was more successful than others. Hill (1988) studied a sample of 31 US and North Sea based IJVs in the oil industry. The parent firm's control was operationalized as the extent of influence the parent firm exercised over ten important IJV activities. In his study, the dominant IJV did not exhibit superior performance. In a similar manner, Blumenthal (1988) and Tillman (1990) also found that control did not have a direct significant impact on IJV performance.

Geringer and Hebert (1992) suggested that compared to the dominant controlled IJV, the stronger mutual hostage position enjoyed by the shared IJV

promotes mutual trust, reduces the risks associated with conflicts, stabilizes the cooperative relationship and limits opportunistic behavior. Therefore, the shared IJV should have better performance than the dominant controlled IJV. They tested this hypothesis with a sample of 76 US-based IJVs and their contention that the shared IJV outperformed the dominant controlled IJV was strongly supported.

Another group of entry mode research studies the relationship between the parent firm's focus of control and IJV performance. These studies propose that some specific dimensions of IJV performance are associated with the dominant control by the parent firm who possesses distinctive competence in these dimensions (Hill, 1988). The argument is that focused control appears to be necessary to ensure the effective transfer of distinctive competence to the IJV. If the parent firm cannot adequately exercise control over activities in which they have distinctive competence, both their competitive position and their proprietary assets could suffer from opportunistic behavior and ineffective strategy implementation (Hill, 1988; Mirus & Yeung, 1999). Under these circumstances, it would not be surprising that the parent firm may declare that their expectations with the IJV are not met. Schaan (1983) suggested that the IJV's success, or the extent to which the parent firm's expectations were met, was the function of the fit among three variables: the parent firm's objectives, the parent firm's focus of control, and the control mechanisms. Based on a sample of ten IJVs, he found that the IJV that achieved this fit evidenced better performance. Similarly, Lecraw (1984) found that the MNC's level of control over areas perceived as critical to the success of its overseas subsidiaries was positively related to these subsidiaries' performance. Awadzi (1987) studied a sample of 40 US-based IJVs. His results also showed that the exercise of dominant control over specific activities by either one of the parent firms was positively related to IJV performance.

Among IJV performance research, research on the ownership-control-performance relationship deserves special attention. These studies use the share of ownership as a proxy for the parent firm's control over the IJV (Lecraw, 1983; Simyar,

1983; Artisien & Buckley, 1985; Daniels et al., 1985; Beamish, 1988). Generally, these studies find the relationship between ownership and IJV performance to be, at least, inconclusive (Reynolds, 1979; Beamish, 1985). For instance, Lecraw (1984) studied 153 wholly owned and jointly owned subsidiaries located in developing countries. His results showed that jointly owned subsidiaries tended to exhibit lower performance. Kogut (1988) studied 148 US-based IJVs and did not find any significant relationship between dominant ownership and IJV performance.

Blodgett (1987, 1991) suggested that when the contributions from each partner complement each other, equal bargaining power between the partner firms would put pressure on both of them to cooperate. Equal bargaining powers, which is reflected in the parent firm's equity holdings, may pool resources together, stabilize the IJV and ensure the IJV's success and survival. Blodgett (1987, 1991) studied 69 IJVs and the results indicated that the IJV with equal division of ownership tend to have a significantly higher likelihood of achieving long life than the IJV with unequal divisions of equity. The median life of the majority/minority IJVs was 3.37 years, versus 6.94 years for equally owned or approximately equally-owned IJVs (Blodgett, 1987, 1991). In addition, Blodgett's empirical study showed that the majority/minority joint venture's contracts had a tendency to be renegotiated more frequently and the cumulative proportions of the equally owned IJV's survived every year was consistently higher than those of the majority/minority joint venture. Woodcock and Geringer (1990) studied a sample of 2,503 IJVs based in Canada and reported similar results.

Except ownership and control, previous studies also identified some other factors that may influence IJV performance. For instance, Killing (1988) suggested that task complexity was an important determinant of IJV performance. Parkhe (1991) hypothesized that inter-firm cultural and organizational diversity adversely affected IJV performance. Beamish (1988) found that the partner's commitments were a good

predictor of IJV performance. Harrigan (1988) indicated that alliances between similar parent firms tended to be more successful than asymmetric partnerships. Kogut (1988) proposed that the parent firm's nationality, industry setting and the IJV's functional scope all had significant impact on the IJV's stability.

2.5 Conclusions

The preceding review show that the literature on IJV performance has generated limited understanding over the control-performance relationship. Empirical evidence is scant and results are frequently inconclusive or conflicting. This situation could be interpreted as the result of the field's fragmentation and weak theoretical development.

First, prior research is highly fragmented in terms of the subjects of investigation. These studies have focused on a mix of IJVs in developed countries (DC) (Killing, 1983; Geringer 1988, 1991; Awadzi, 1987; Blodgett, 1987; Kogut 1988; Geringer & Hebert, 1992) and in less developed countries (LDC) (Tomlinson, 1970; Schaan, 1983; Beamish, 1984; Lecraw, 1984; Tillman, 1990). As suggested by Beamish (1985) and supported by Austin (1990), LDC IJVs typically have purposes and dynamics quite different from those of DC IJVs. For instance, the motives underlying LDC IJVs are often tactical in nature and may reflect the parent firm's desire to respond to foreign countries' regulation (Austin, 1990). Since different motivations and dynamics may have different implications on the control-performance relationship (Anderson, 1990), it is inevitable that the control-performance research often generates inconclusive or conflicting results.

Secondly, the fragmentation of prior research is also evident in the conceptualization and operationalization of some key concepts. For instance, the concept of IJV control has been operationalized as the parent firm's attitudes toward control, the strategy's demand for control, the mechanism of control, the focus of

control, the extent of control, and the division of ownership. The concept of IJV performance has been operationalized as the management's perception of specific dimensions of IJV performance, the management's perception of the IJV's overall performance, the IJV's stability and duration, and the IJV's financial performance. This constitutes serious threats to the validity of control-performance studies and may considerably limit the comparability of research results.

Third, prior research on IJV performance exhibits serious theoretical weaknesses. They lack a sound theoretical foundation and very few researchers relied on explicit and well-established theoretical frameworks. As Parkhe (1993) noted, research on IJVs lacks a strong theoretical core or an encompassing framework that effectively integrates past research and serves as a springboard for launching future research. For example, some entry mode research applies TCA to analyze how factors may influence the choice of entry mode. Nevertheless, they fail to address the relationship between entry mode and IJV performance. Other entry mode studies investigate the relationship between entry mode and IJV performance. Whereas they do not include factors that influence entry mode choice. In control-performance research, almost all studies focus on the control-performance relationship while factors that influence the parent firm's control over the IJV are largely ignored. Hence, these studies have missed some important variables and are, therefore, theoretically incomplete.

More importantly, the control-performance research is fundamentally misleading and misinterprets the primary tenets of TCA. According to Donaldson (1995), TCA is, in effect, a contingency theory. One of its major premises is that when the firm plans to expand its operations, it will face two major problems. First, there is no well-developed market for intangible assets (Williamson, 1996). The second problem is associated with information asymmetry and opportunistic behavior (Williamson, 1975; Hennart, 1988). If it share its knowledge based intangible assets with the local partner, its partner may acquire the intangible assets and operate a

separate entity at a future date. This may reduce its long-term profit. In order to achieve better performance, the owners of intangible assets need to choose structural arrangements that minimize this risk (Williamson, 1975; Ouchi, 1977; Anderson & Gatignon, 1987). This implies that the firm should select appropriate mode of control and governance structure according to its stock of intangible assets (Hennart, 1991). The larger the amount of proprietary intangible assets, the more control and more ownership the firm should acquire in order to protect its valuable intangible assets (Hennart, 1988; Kogut, 1988). Whereas, when the firm owns little in the way of rent-yielding intangible assets, it may select lower levels of control and a small share of ownership in order to access the resources and complementary know-how that are monopolized by local firms (Hennart, 1991). Therefore, the more valuable the firm's intangible assets are, the more control and the larger the shares of ownership the firm needs to acquire in order to guarantee better performance (Geringer & Hebert, 1989). This stipulates a significant interaction effect between the firm's intangible assets and the firm's control on IJV performance. Thus, it is imperative to include factors that reflect the firm's intangible assets in the theoretical model for the control-performance relationship. Nevertheless, to date, all control-performance research studies the relationship with bivariate techniques by relating control to IJV performance. None of the authors has studied the interaction effect between intangible assets and control. This might explain why these studies have generated inconclusive and conflicting results.

In addition, the IJV is a special mechanism for pooling complementary assets owned by both the foreign parent firm and the local firm (Balakrishman & Koza, 1993). This implies that in studying IJV performance, we should consider the contribution from both sides. However, except for a recent study by Mirus and Yeung (1999), previous studies have typically neglected the contribution made by the host-country firm. Consequently, their conclusions may be distorted or, at best, incomplete.

Further, many prior studies rely on fine-grained approaches and use small convenience samples. These methodologies may provide a rich picture of the complexities and nuances associated with the IJV control. Nevertheless, their results may suffer from weaknesses in generalizability, replicability and statistical rigor because of the small samples (Harrigan, 1983). Finally, most IJV performance research tends to study a group of IJVs located in a specific country. However, the impacts of the foreign parent firm's nationality have been ignored. This may also affect the significance of the control-performance relationship since the parent firm's nationality is also a determinant of IJV performance (Kogut, 1988).

In conclusion, the nature and the strength of the control-performance relationship have yet to be established and tested. In order to accomplish this task, this study will introduce a theoretical model based on the resource-based theory (Wernerfelt 1984) and TCA (Williamson, 1975). At the center of this model, we plan to examine the interaction effect between the parent firm's intangible assets and the parent firm's degree of control on IJV performance. In this model, we will also consider the contributions made by both sides of the IJV's parent firms.

Chapter III

Theoretical Framework

Based on our review of the literature, this chapter presents a conceptual model for IJV performance. First, we will clarify the key concepts that make up the model. Research hypotheses linking ownership, intangible assets and IJV performance will then be formulated.

3.1 The Conceptualization of IJV

A joint venture is a jointly owned legal entity that brings together two or more legally distinct parent firms through the pooling of a portion of their resources. In the case of an IJV, at least one parent firm must be headquartered outside the venture's country of operations. The IJV represents a governance mode for international transaction that rests between the polar opposites of arms-length market contracts and those conducted within a firm (Buckley & Casson, 1988; Hennart, 1988).

A number of strategic objectives explain the firm's motivations for the formation of the IJV (Harrigan, 1985; Porter & Fuller, 1988; Contractor & Lorange, 1988; Hamel, 1991; Hennart, 1991). First, the partner firm may lack and need the strength and resources owned by its partners. Second, the IJV may help the firm to achieve scale economies. Third, the high costs associated with capital, equipment and research and development can be shared with other firms and therefore the IJV can reduce the risk and lower the burden of cost.

There exist different schemes for the classification of the IJV (Killing, 1982; Lecraw, 1984; Hennart, 1988; Buckley & Casson, 1996). One popular approach is to classify the IJV according to the distribution of equity (ownership). According to this approach, the IJV can be categorized as the majority/minority IJV where one partner

owns more than 50 percent of the ventures' equity, or the shared IJV where the partners own equal shares of ownership and no one holds majority of the equity.

3.2 IJV Performance.

Generally, performance is viewed as the efficiency of the process through which inputs are converted into outputs (Harper, 1984). It is virtually synonymous with the term of productivity - the efficiency of producing (Harper 1984). Our review of the IJV performance literature indicates that IJV performance has been conceptualized and operationalized in many different ways and no consensus exists as to the appropriate definition and measurement of this construct. Previous studies have used both objective and perceptual measures and all of them have limitations. Traditional accounting return measures can only reflect the IJV's historical performance and may not adequately reflect the extent to which the IJV achieves the parent firm's objectives (Seth, 1990). For example, the parent firm that targets at new markets may focus on the long-term growth and may not regard short-term profitability as a sign of poor performance. These measures are also unreliable because of the use of transfer pricing. Other objective measures such as the IJV's duration, the IJV's stability, significant changes in the IJV's ownership structure, and renegotiations of the IJV's contracts are also inadequate to reflect the extent to which the IJV has achieved the parent firm's objectives (Killing, 1983; Artisien & Buckley, 1984; Blodgett, 1987). For instance, a firm may use the IJV to access the other firm's resources. In the process, the firm will gradually increase its own capabilities and the need for its partner's cooperation will gradually diminish. Consequently, the firm may increase its share of ownership or even replace the established IJV with its wholly owned subsidiary by buying-out its partners (Woodside & Pitts, 1996). Under such circumstances, the instability, significant changes in the IJV's ownership structure, and even the dissolution of the IJV may signal successful completion of the learning

process and may not indicate poor performance. In some cases, the IJV's dissolution or ownership restructuring may represent adaptation to changes in the environment (Gomes-Casseres, 1987).

Perceptual measures, on the other hand, are subject to respondent biases. Since different respondents may have different frames of references and different personal values, the criteria they use may not be the same (Schaan, 1983). Under some circumstances, perceptual measures may not reflect IJV performance at all. Instead, they may reflect some psychological or cultural artifacts (Osland & Cavusgil, 1996).

In evaluating the validity of performance measures, one central issue revolves around the question of whether the performance measures are able to reflect the extent to which the IJV achieve the objectives of the parent firms (Killing, 1983; Artisien & Buckley, 1984; Blodgett 1987; Anderson, 1990; Geringer & Hebert, 1991). Conceivably, before we design a set of valid measures of IJV performance, it is imperative to find out the objectives of the parent firm. The literature suggests that the objectives of the parent firm include technology transfer, joint research, access to materials, entry to new markets and scale economies (Porter & Fuller, 1988; Contractor & Lorange, 1988). In the case of the American firm's IJVs in Japan, however, this notion deviates dramatically from the findings of two comprehensive surveys conducted by the Conference Board (1989) and by Kearney (1991) respectively. The Conference Board surveyed 168 large firms that engage in FDI activities in Japan. Kearney (1991) surveyed 340 American companies that have subsidiaries in Japan. Both surveys indicate that growth in sales and profits is the overwhelming objectives behind the American firm's FDI activities in Japan. Other motivations such as accessing new technology accounts for less than 1 percent among the firms being surveyed. Correspondingly, these two surveys reveal that an overwhelming number of investing firms use sales or profit to measure their subsidiaries' success.

In the case of the American firm's IJV in Japan, the major objective of the American firm is to increase its sales and profit. Therefore, traditional performance measures such as productivity, profit, and growth in sales and profit do reflect the extent to which the parent firm's objectives are satisfied, This is even obvious if we take a detailed look into the data on the American firm's subsidiaries in Japan.

Considering the results of these two surveys, in the present study, we use four principles to guide the selection of IJV performance measures. First, since any single measure is inherently deficient to capture the IJV's diverse goals, multidimensional performance measures are essential. More specifically, the adopted measures should reflect performance targets of the parent firm's in terms of sales, profits, growth in sales and profits, as well as efficiency. Second, performance measures should capture not only the IJV's accounting return but also the IJV's assets and labor efficiency, which is believed to be the best guarantee of the firm's survival and growth (Armitage & Atkinson, 1990). Third, since increasing the parent firm's value is one of the major motivations behind the FDI activities (Coase, 1937; Caves, 1971; Dunning, 1973; Buckley & Casson, 1976; Hennart, 1982, Morck & Yeung 1991), the performance measures should also reflect the IJV's contribution to the American firm's value. Fourth, IJV performance measures should be able to mitigate the value distortion caused by artificial transfer pricing.

Based on the above criteria, twelve measures are adopted to measure the IJV's efficiency and growth in sales and profit. They are (1) capital productivity; (2) labor productivity; (3) return on capital; (4) net profit; (5) taxable income; (6) sales; (7) growth in capital productivity; (8) growth in labor productivity; (9) growth in sales; (10) growth in net profit; (11) growth in taxable income and (12) growth in return on capital. We used Tobin's Q (Morck & Yeung 1991) to measure the IJV's contribution to the American firm's value.

Among these measures, return on capital, net profit, taxable income and sales reflect the parent firm's objectives in terms of sales and profit. Growth in sales, growth in net profit, growth in taxable income and growth in return on capital reflect the parent firm's objective in terms of growth in sales and profit. Capital productivity and labor productivity measure the IJV's asset and labor efficiency. Growth in labor productivity and growth in capital productivity measure the IJV's improvement in terms of asset and labor efficiency.

With respect to the factor of transfer pricing, Al-Eryani, Alam and Akhter (1990) examined the influence of both environmental and firm-specific factors on the choice of international transfer prices. They found that the existence of legal restrictions over transfer pricing, the multinational's size, the host country's political and social stability, the liberalization of government regulations on FDI, and a developed host country encourage the use of a market-based pricing system. In the case of the American firm's IJVs in Japan, all relevant factors favor the use of a market-based pricing system. Japan is a developed country with stable social and political environment. Its legal system forbids the use of artificial transfer pricing (Takahashi, 1976). Although compared to other industrialized countries, its regulation on FDI is relatively heavy (Yoshitomi & Graham, 1996), it has undergone a long process of deregulation under international, especially, the United States' pressure. In addition, according to our data, the American parent firm's major market focus is the Japanese market. The IJV's average export and import ratios are 12 percent and 21 percent respectively and the IJV's import or export agencies are mainly Japanese firms. This leaves the American parent firm with less incentive and little opportunity to take advantage of transfer pricing. In addition, the IJV itself is an effective barrier to the practice of transfer pricing. Since each of the IJV's parents has its own interests, the practice of transfer pricing that favors one parent firm's interests will inevitably hurts its partner's interests. Considering that both Japan and the United States are developed countries, their business people are extensively involved in the international market

and have convenient access to information on international market prices. It is almost impossible for one partner to hide information and engage in manipulative transfer pricing practices. However, despite the fact that these factors may restrict the use of transfer pricing in the American firm's IJVs in Japan, the practice of transfer pricing will undeniably exists, especially when there is no external market for the parent firm's or the IJV's products.

Among the twelve measures of IJV performance, capital productivity, labor productivity, return on capital, net profit, taxable income and sales may be affected by the practice of transfer pricing. However, if we assume that the firm's transfer-pricing policy is consistent over the years, then the growth measures that reflect improvement in the IJV's performance should not be affected by such practices.

Finally, these performance measures are valid since studies indicate that the management's perceptual assessment of IJV performance is highly correlated with the objective measures of IJV performance (Beamish, 1984; Geringer & Hebert, 1991; Osland & Cavusgil, 1996). For instance, Osland and Cavusgil (1996) report that profit is the dominant source of the parent firm's satisfaction. This suggests that in the absence of other performance data, the use of objective measures of IJV performance should be justified.

According to the results of correlation analysis, some IJV performance measures are closely correlated. This prompts us to do an exploratory factor analysis in order to find out the distinct dimensions underlying the 12 indicators of IJV performance. The exploratory factor analysis revealed four distinct dimensions of IJV performance: one factor (F1) is dominated by the IJV's growth in sales, the IJV's growth in labor productivity, and the IJV's growth in capital productivity. This factor is labeled as the IJV's ***growth in sales and productivity***; one factor (F2) represents the dimension underlying the IJV's total revenue and profit. This factor is named as the IJV's ***revenue and profit***; the third factor (F3) underlies the IJV's growth in net profit and growth in return on capital. This factor is called the IJV's ***growth in profit factor***;

the fourth (F4) underlies the IJV's labor productivity and capital productivity. It is labeled as the IJV's ***productivity factor***. The communality scores of the factor analysis show that these four factors can satisfactorily explain the variation in most indicators of IJV performance and the four factors together are able to explain a large proportion of the total variance in the IJV performance. Therefore, we regard these factors as four distinct dimensions of IJV performance and will use them and Tobin's Q as dependent variables in later discussions.

3.3 Complementary Resources

For the American firm who plans to invest in Japan, it must own sufficient resources to achieve economies of scale and to absorb the high costs associated with marketing and the enforcement of patents and contracts (Hood & Young, 1979). Studies indicate that the firm's size reflects its capability to absorb these costs (Buckley & Casson, 1976; Kumar, 1984; Caves & Mehra, 1986; Yu & Ito, 1988; Terpstra & Yu, 1988; Kimura, 1989). However, size itself cannot enable the American firm to outperform its local rivals (Dunning 1977). In order to outperform local competitors and stay competitive, the American firm must possess rent yielding, knowledge-based intangible assets (Nakamura & Yeung, 1994; Agarwal & Ramaswami, 1992).

On the Japanese side, the Japanese partner generally owns some complementary resources that can help the American firm to penetrate the Japanese market. Studies show that Japanese market has many barriers that impede the penetration of foreign companies (Kearney, 1991; Sako, 1992). First, the exorbitant land prices result in skyrocketing rents and industrial real estate prices. Second, the labor market is characterized by extreme shortages, lifetime employment and attitudes that discourage employment with foreign firms (Yoshihara, 1996), which together create difficulties in locating and hiring qualified personnel. Third, it is much more

complex to do business in Japan than it is in the United States because it is extremely difficult to understand the intricate relationships which drive business and government decision-making processes. Fourth, Japanese distribution systems are characterized by multi-tiered, exclusive trading relationships and cross-ownership with manufactures that are difficult for the American company to access. Fifth, in Japan, the keiretsu is a popular and influential organizational form. It has interlocking business and ownership relationships and tends to favor exclusive business practices within the keiretsu group. Further, many ministry guidelines, policies and regulations lack transparency and discriminate against the foreign company. Finally, the American firm faces a completely different consumer force that tends to be prejudiced against foreigners. It takes time to cultivate a sense of trust between the American suppliers and the Japanese customers. Such a relationship must go through the complex maze of a closed business community, tradition-bound business customs, and interpersonal relations, which is often beyond even the wildest imagination of the American businessmen (Kang, 1990).

The Japanese firm possesses the necessary assets, knowledge, skill and connections to overcome these barriers (Nakamura & Yeung, 1994) and the American firm have the newer, better technology or other organization specific knowledge the local Japanese firm is looking for (Kang 1990; Kudo, 1994; Nakamura & Yeung, 1994). Therefore, the American firm and the Japanese firm are complementary to each other. By combining the assets, resources and capabilities from both sides, the American firm can accelerate its market penetration process and achieve superior performance.

However, according to TCA, such combination cannot be easily accomplished through market transactions (Williamson, 1996). The contributions from both sides have the characteristics of knowledge-based property. Because of information asymmetry and the lack of a perfect market, one partner cannot accurately evaluate the value of assets contributed by another partner before the assets are contributed

(Hendryx, 1986; Balakrishnan & Koza, 1986). Considering that the intangible assets are also difficult to specify in a contract (Williamson, 1975, 1996; Chi, 1996; Mirus & Yeung, 1999), the transfer of the complementary resources faces the roadblock of adverse selection (Akerlof, 1970). In addition, tangible assets, such as capital and land, that can be easily evaluated, could be so expensive that they constitute a huge financial risk and are beyond the ability of the American firm's ability to acquire (Kearney, 1991; Mangum, Kim & Tallman, 1996). Under these circumstances, the IJV provides one feasible solution by which the American firm and the Japanese firm are able to pool their complementary resources together and share the IJV's equity and profit.

3.4 Transaction-Cost Analysis

When a firm decides to make direct investment in a foreign country, it may find itself lacking the knowledge, resources and competence to develop local market. It needs to acquire complementary resources, competencies and assets through partnership in order to achieve its strategic objective (Hamel, 1991; Inkpen, 1992). Meanwhile, by going into partnership with other firms, the firm may run the risk of giving away its critical resources or capabilities to its potential competitors. This makes it important for the firm to protect its critical resources and capabilities with certain levels of control (Hennart, 1988).

The transaction cost framework of analysis (Williamson, 1975) has been widely used to examine the risks associated with different forms of partnerships (Beamish & Banks, 1987; Harrigan, 1988; Hennart, 1988; Kogut, 1988; Chi, 1990; Osborn & Baughn, 1990). The central tenet of TCA is to identify the sources of transaction costs and to specify the governance structure that minimizes these costs. The validity of this framework depends on the existence of bounded rationality, information asymmetry and opportunistic behaviors (Williamson, 1975). In recent years, TCA's assumption of the existence of opportunistic behaviors has received

severe criticisms. For instance, Granovetter (1985), Perrow (1986) and Hill (1990) argued that TCA views interorganizational relationships as discrete, static and technologically separable exchange transactions, and tends to neglect the social, cultural context of economic transactions (Zucker, 1986; Johnson & Mattsson, 1987). They believe that TCA is misleading because it ignores the impact of trust and commitment on transaction costs and assumes that economic actors are opportunistic and exhibit self-interest-seeking behavior. Donaldson (1995) even suggested that the assumption of opportunistic behavior was untenable.

While these criticisms may have their rationales, there does exist extensive empirical evidence in support of TCA's assumption of opportunistic behavior and self-interest seeking behavior in interorganizational relationships, especially in the case of the IJV. It is revealed that conflict is the inherent nature of the IJV (Habib, 1983; Killing, 1983; Devlin & Bleackley, 1988; Parkhe, 1991) and is one of the major causes of bad performance and failure of the IJV (Reynolds, 1979; Killing, 1983; Harrigan, 1985). Although many authors suggest that cooperation is the fundamental nature of business practices (e.g. Donaldson, 1995), the risk of exposing a firm's critical resources is not simply a fallacy. For example, Kang (1990) warned that as soon as the foreign firm got established in the Japanese market, it would see many Japanese companies, perhaps even its own partners, supply, distribute or introduce similar products to the market. They may even make minor improvements on the products to make them more attractive. In the field of technology transfer, there are numerous examples in which the Japanese licensees try to acquire technologies and know-how from the American company beyond the agreed-upon scope (Kang, 1990, Kudo, 1994). Therefore, while the influence of social, cultural context (Ouchi, 1980), trust and commitment (Hebert, 1994) on transaction cost should be realized, we should also recognize the existence of conflict and opportunistic behavior our framework of analysis. Thus, the use of TCA in our analysis is justified.

For the American firm, the major risk they face in the IJV is associated with the possibility of exposing its intangible assets and core capabilities and the Japanese partner's opportunistic behavior (Buckley & Casson, 1988; Hennart, 1991; Wolf, 1995). This risk is in line with the Japanese cultural propensity to absorb foreign technology, religion and even culture to suit their internal needs (Kang, 1990). It is imminent because the Japanese perceptions of intellectual property and contract are different from those of the Americans (Henderson, 1973; Kearney, 1991). The patent system in Japan typically has the rapid and efficient dissemination and diffusion of technology as its primary objective, with protection of individual intellectual property rights secondary (Foreign Affairs and International Trade Canada & Industry Canada, 1994). It encourages imitation because the Japanese claim interpretation theory permits minor modification (Takenaka, 1995). It is widely documented that Japanese businessmen rely much less on the legalities of contracts among themselves than Americans do (Hoshino, 1971; Kawashima, 1967; Isawada, 1967; Hecke, 1962; Kawashima, 1974; Kuwahara, 1989; Friedman, 1996). Technology-transfer contracts are often signed the way the foreigners wanted and performed the way the Japanese wanted. The results are that Japanese siphon off the technology know-how to the Japanese parents and leave the joint cooperation to wither away (Kang, 1990). There are many instances when Japanese instinctively depart from the signed contract in the performance phase, feeling from their own psychological and social makeup that adjustments are appropriate on a man-to-man basis when circumstances pose new problems (Henderson, 1973). This risk is exacerbated by the relative inefficacy of legal enforcement over the IJV. First, in their domestic business affairs, Japanese businessmen rarely use detailed formal contract and litigation (Henderson, 1965; Maher & Wong, 1994). They depend largely on traditional organizational structures, social hierarchy and authority to resolve conflicts. The adjustment to contracts is relatively flexible (Kiyoshi, 1962, 1969; Foreign Affairs and International Trade Canada & Industry Canada, 1994). A second point worth mentioning is the ambiguity

of transnational law and the inefficacy of transnational litigation. This is not just the usual problem of judicial administration associated with expense, time, inept procedures and remedies. Transnational lawsuits generally, and U.S.-Japanese legal actions specifically, reach an exquisite degree of disutility by the combination of ambiguous conflicts rules, unenforceable probation, difficulty in the choice of law clauses (McCartney, 1959; Lenhoff, 1961; Gauchi, 1995), translation problems and a paucity of truly adequate bilingual legal experts (Henderson, 1963; Nishino, 1995). Therefore, the efficacy of law in the international private contracting process is premised on good faith and mutual purpose - things that cannot be legally compelled. Litigation usually means inadequate compensation (Kitagawa, 1969). Because of these concerns, the American firm needs to acquire more control and ownership in order to protect its intangible assets (Nakamura & Yeung, 1994).

3.5 Ownership and Control

Our review of the literature indicates that the distinction between equity ownership and control is not very clear. Many firms consider equity ownership tantamount to control and therefore desire high levels of equity ownership. Gullander (1976), for example, asserted that management control was said to be exercised for a company that has the majority equity share. Brooke and Remmers (1978) found that most managers equate equity ownership with control and prefer 100 percent ownership. Franko (1971) also found a predilection of the American firm for either sole ownership or majority ownership where sole ownership was not possible. Even some governments' regulations demand majority equity ownership as the means to ensure local control.

On the other hand, some scholars suggest that a firm can exercise effective control with shared or even minority ownership (Beamish, 1988; Killing, 1988). They argued that IJV control was not a strict and automatic consequence of ownership

(Friedman & Beguin, 1971; Behrman, 1970; Gullander, 1976; Rafii, 1978; Schaan, 1983; Geringer, 1988; Beamish, 1988; Geringer & Hebert, 1989; 1992). They proposed that the degree of control may deviate from the share of equity holdings (Friedman & Beguin, 1971) and the firm may choose other control mechanisms to achieve effective control (Behrman, 1970; Gullander, 1976; Schaan, 1983). These mechanisms include the right to veto (Friedman & Beguin, 1971), the appointment of the IJV's board of directors and other key management positions (Behrman, 1970; Schaan, 1983), control over raw materials (Gullander, 1976), formal agreements, the planning process, the reporting relationships and a variety of informal mechanisms (Schaan, 1983). In addition, some authors suggested that the parent firm might choose to exercise control over specific strategically important activities rather than over the whole IJV (Schaan, 1983; Awadzi, 1987; Geringer, 1988).

These differences have caused extreme confusion in the ownership-control-performance research. In order to resolve these differences, we have to make a clear distinction between the concept of de jure control and the concept of de facto control. De jure control refers to the firm's right to make decisions for the IJV, which is determined by the firm's share of equity ownership (Gullander, 1976). De facto control refers to the control a firm actually exercise over the IJV (Friedman & Kolmanoff, 1961; Gullander, 1976). While de jure control represents the parent firm's right, potential, or ability to control, de facto control represents the control a firm actually exercises.

This distinction is necessary since a firm with high de jure control may have little de facto control. The firm may have the right to control, but the right may not be exercised. According to Pfeffer and Salancik (1978), the most effective way of exercising power is to achieve desired objectives without using power. For instance, a supervisor may have the power to fire his/her subordinates if they do not come to work on time. Nevertheless, he/she might have never exercise this power, and this does not mean he/she has no control over his/her subordinates. His/her control may have been

very effective since his/her subordinates always come to work on time. Similarly, the parent firm with majority ownership and high de jure control may exercise little control and hence have little de facto control. This does not necessarily mean that there is a discrepancy between its control and its share of ownership. For this reason, we propose to extend Ouchi (1977), Etzioni (1965), Baliga, and Jaeger's (1984) definition of control. By our definition, control refers to the potential, the right, and the process by which one entity influences the behavior and output of another entity. In the IJV, the parent firm's objective in demanding equity ownership and control is to prevent the dissemination of its proprietary assets and to make sure that the IJV be operated according to its strategic objectives. The target is to own the potential, the right, or the option to exercise control, rather than the exercise of control itself. If problems emerge, control will be exercised. If the IJV operates smoothly, control will not be exercised and the parent firm would be pleased to let the IJV's management run the ventures without intervention. Similarly, the American firm may hire Japanese executives to fill all the management positions in its IJV and allow the local management to have full autonomy over the IJV's operation. This, by no means, implies that the American firm has no control over the IJV. Instead, it can fire the management whenever it is deemed necessary. Therefore, de facto control is not an accurate indicator of the firm's control and only de jure control can truly capture the parent firm's control over the IJV. Therefore, in this study, we use a firm's share of ownership to measure its control over the IJV.

Previous studies suggest that parent firms with minority ownership may acquire a disproportionately large voice in the management and control of the IJV through the use of different classes of shares, management contract, veto powers, and the supply of essential industrial property, technology, materials, services, etc. (Friedman & Kolmanoff, 1961; Schaan, 1983; Beamish, 1988; Wolf, 1995). However, this disproportionate control enjoyed by the parent firm with minority ownership does not contradict our notion of the relationship between ownership and control. Despite

the fact that a parent firm can gain control over some important issues with minority ownership, increased share of ownership is accompanied with increased control (Wolf, 1995). First, the mechanisms that can be used to protect minority interest are available only when the parent firm acquires a specific share of ownership (Wolf, 1995). As an illustration, in Portugal it would be folly to take a 24 percent interest in a joint venture since with 75 percent of ownership the majority partner can vote for capital increases, dissolution, mergers and alteration of articles, or impose drastic legal changes without the consent of the minority partner (Wolf, 1995). Second, from a property right point of view, the determination by one party of the percentage of capital it should have is intricately tied up with its voting rights and the protection of its minority rights (United Nations, 1971; Wolf, 1995). Such mechanisms like the representation on the board, (Friedman & Kolmanoff ,1961), staffing, appointment of key management positions (Behrman, 1970; Rafii, 1978), the planning process, the reporting relationships (Schaan, 1983) and the right to exercise control over specific strategically important activities (Schaan, 1983; Awadzi, 1987; Geringer, 1988) all depends on the firm's share of ownership. For instance, Cyr (1995), Collins and Doorley (1991) found that the firm's representation on the IJV's board of directors is in proportion to its acquired shares of ownership.

In summary, a parent firm with minority interest can gain control over some important issues through supplementary mechanisms. Nevertheless, these supplementary mechanisms are contingent on the firm's share of ownership. They are legitimized by the firm's share of ownership. In other words, the existence of those so-called supplementary mechanisms is not the basis of the firm's control. Instead, the firm's control depends on its ownership position. It is the firm's share of ownership that enables it to exercise control through these supplementary mechanisms. Therefore, we conclude that there exists a consistent relationship between ownership and control, though this relationship might not be linear.

3.6 Resource-Based Theory

The resource-based theory examines the relationship between a firm's performance and its resources (Wernerfelt, 1984). Viewed from this perspective, a firm's competitive advantage and above-normal returns is the result of its unique constellation of valuable resources (Barney, 1991). The valuable resources are found to be rare, durable, imperfectly imitable and nontradable (Barney, 1991; Dierickx & Cool, 1989). All these features point to the knowledge-based assets or intangible assets. For the IJV, its resource may come from three different sources: resources cultivated by the IJV itself, resources contributed by the IJV's foreign parent firm, and resources contributed by the IJV's local parent firm. Figure 3.1 presents an overview of this framework.

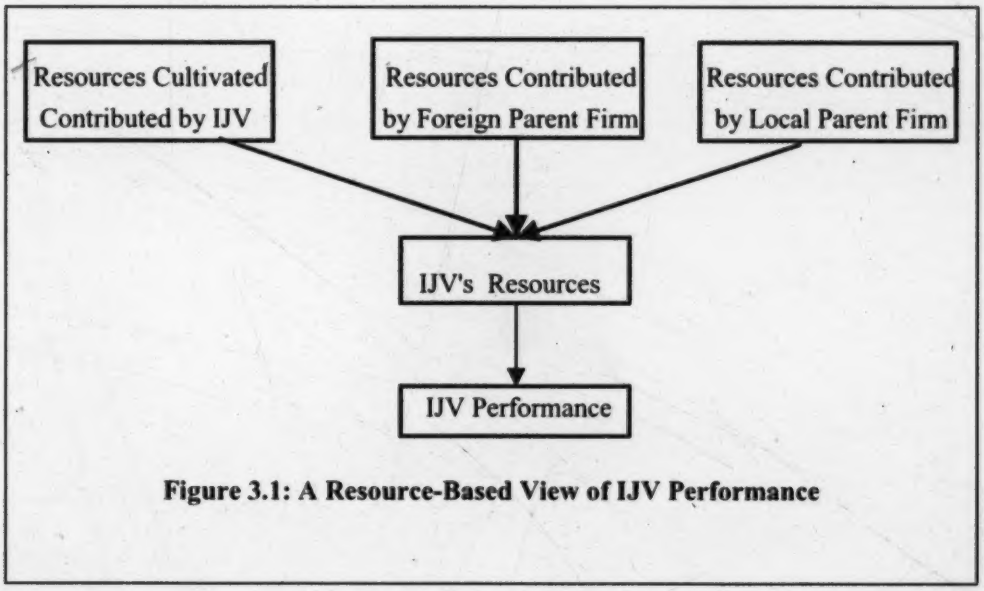

Resources Cultivated Contributed by IJV
Resources Contributed by Foreign Parent Firm
Resources Contributed by Local Parent Firm
IJV's Resources
IJV Performance

Figure 3.1: A Resource-Based View of IJV Performance

3.7 A Theoretical Model for IJV Performance

According to the resource-based theory, the IJV's performance is determined by its level of resources (intangible assets). In section 3.6, we suggest that the IJV's resource endowment has three sources: resources cultivated by the IJV itself; resources contributed by the IJV's foreign parent firm; and resources contributed by the IJV's local parent firm.

In the case of the American firm's IJV in Japan, the American firm tends to contribute more heavily in the areas of technology (product design, manufacturing know-how, special equipment) and global support (technical, marketing, and maintenance services) than its local Japanese partner (Kang 1990; Kudo, 1994; Nakamura & Yeung, 1994). According to TCA, the American firm needs to acquire sufficient control and ownership in order to protect its intangible assets from leaking to its local partner. Conceivably, if the American firm acquires its desired level of ownership and control, it will no longer worry about the possibility of leaking its intangible assets and it will be pleased to transfer all the needed intangible assets to the IJV.

Numerous studies indicate that the American firm desires 100 percent ownership or majority ownership when 100 percent ownership is not possible (Franko, 1971; Stopford & Wells, 1972; Negandhi & Baliga, 1981; Gatignon & Anderson, 1988; Kearney, 1991; Erramilli & Rao, 1993; Erramilli, 1996). However, 100 percent or majority ownership may not be realized for a multitude of reasons. First, as discussed in Section 3.3, the American firm may lack local knowledge, expensive land, skillful personnel and other important resources that are essential for its success in Japan. In order to acquire these complementary resources, the American firm has to give up part of the IJV's ownership and control to the Japanese firm who owns these resources. Second, an examination of the literature suggests that ownership could be a complex function of numerous factors spanning from host country characteristics,

industry characteristics, to product characteristics, firm characteristics, bargaining power and etc. in addition to the firm's intangible assets (Robinson, 1976; Davidson, 1982; Gatignon & Anderson, 1988; Root, 1988; Franko, 1989; Yan & Gray, 1994; Wolf, 1995). Since the American firm may not be able to acquire its desired level of ownership and control, it will face the risks associated with disseminating its intangible assets without getting the due benefit. Under such circumstance, the American firm will not fully commit itself to transfer its intangible assets to the IJV (Hill, 1988). Conceivably, the amount of intangible assets the American firm is willing to transfer is a function of its perceived risk of dissemination. The more ownership and control the American firm acquires, the less the risk it perceive that its intangible assets will be leaked to its local partner, the more it will be willing to transfer its intangible assets. Given the American firm's stocks of intangible assets, *ceteris paribus*, the more ownership the American firm acquires, the higher the proportion of its intangible assets will be transferred to the IJV, and the better the IJV will perform. Therefore, the American firm's share of ownership will moderate the positive relationship between the American firm's intangible assets and the IJV' performance. Hence, in addition to the common notion that the parent firm's intangible assets is positively related to the IJV's performance, we propose a positive interaction effect between the American firm's share of ownership and the American firm's intangible assets on the IJV's performance. This relationship is illustrated in Figure 3.2.

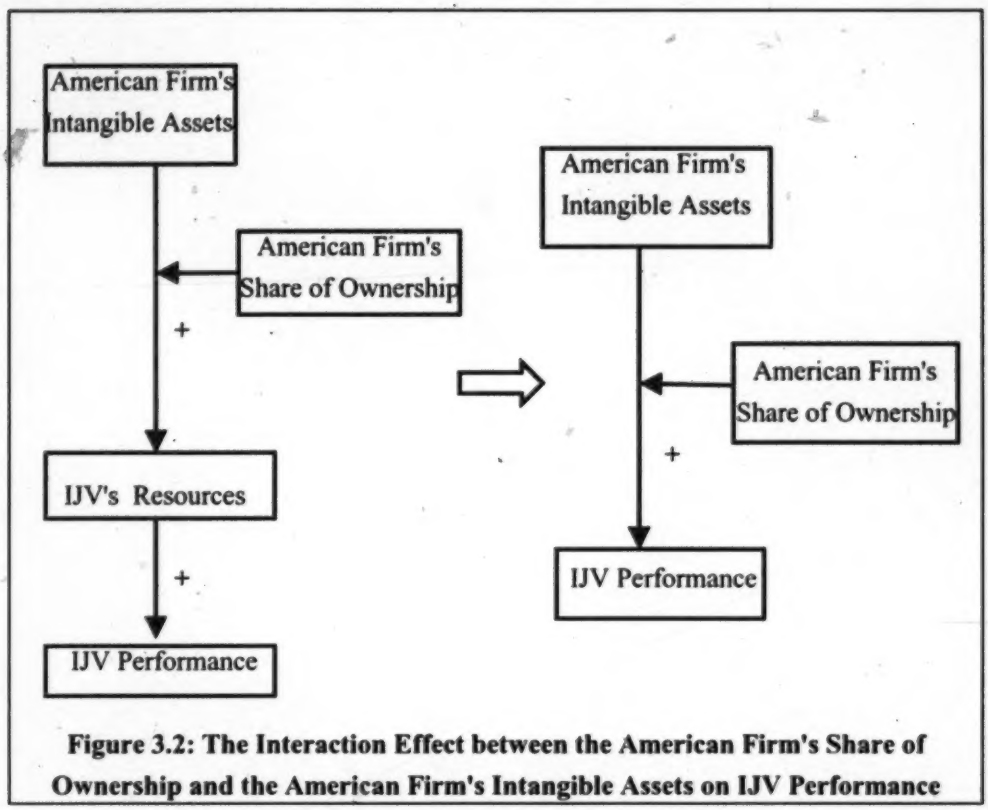


Figure 3.2: The Interaction Effect between the American Firm's Share of Ownership and the American Firm's Intangible Assets on IJV Performance

It should be noted that the sum of the American firm's share of ownership and its Japanese partner's share of ownership should equal 100 percent. The larger the American firm's share of ownership, the smaller the share of ownership its Japanese partner may acquire. Therefore, the Japanese partner's share of ownership equals one minus the American firm's share of ownership. Thus, from now on and without further specification, we only refer to the American firm's share of ownership. By minority ownership, we mean that the American firm has a minority stake in the IJV and correspondingly the Japanese partner has the majority stake. By shared ownership, we refer to 50 percent ownership by the American firm and correspondingly the Japanese partners having equal share of ownership. By majority ownership, we imply that the

American firm has a majority share of the ownership and correspondingly the Japanese partner enjoys a minority position.

Based on the above discussions, we hypothesize:

H1a: The American firm's share of ownership and the American firm's intangible assets have a positive interaction effect on the IJV's growth in sales and productivity.

Specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the American firm's intangible assets on the IJV's growth in sales and productivity also increases.

H1b: The American firm's share of ownership and the American firm's intangible assets have a positive interaction effect on the IJV's revenue and profit.

Specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the American firm's intangible assets on the IJV's revenue and profit also increases.

H1c: The American firm's share of ownership and the American firm's intangible assets have a positive interaction effect on the IJV's growth in profit.

Specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the American firm's intangible assets on the IJV's growth in profit also increases.

H1d: The American firm's share of ownership and the American firm's intangible assets have a positive interaction effect on the IJV's productivity.

Specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the American firm's intangible assets on the IJV's productivity also increases.

Further, the internalization theory posits that one major motivation behind the FDI activities is to increase the investing firm's value by internalizing markets for its intangible assets (Morck & Yeung, 1991). Conceivably, more ownership and control will improve the American firm's internalization process of its intangible assets. As the American firm acquires more ownership and control, a higher proportion of its intangible assets will be transferred to the IJV. This will improve the utilization of its intangible assets and contribute more to its value as measured by the Tobin's Q. Tobin's Q is a financial market-based measure of firm value. It equals to the ratio of the firm's market value to the replacement cost of its physical assets (Morck & Yeung, 1991).

Therefore, we propose a positive interaction effect between the American firm's share of ownership and the American firm's intangible assets on its value. This lead to the following hypothesis:

H1e: The American firm's share of ownership and the American firm's intangible assets have a positive interaction effect on the American firm's value as measured by the Tobin's Q.

Specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the American firm's intangible assets on the American firm's value also increases.

The above discussion and hypotheses deal with the American firm's contribution to IJV performance. As we mentioned earlier, the Japanese partner also contributes to the IJV's performance. For the same reason, the Japanese partner will face the similar problem as its American partner does. Therefore, we propose a positive interaction effect between the Japanese firm's share of ownership and the Japanese firm's intangible assets on the IJV's performance. This relationship is illustrated in Figure 3.3.

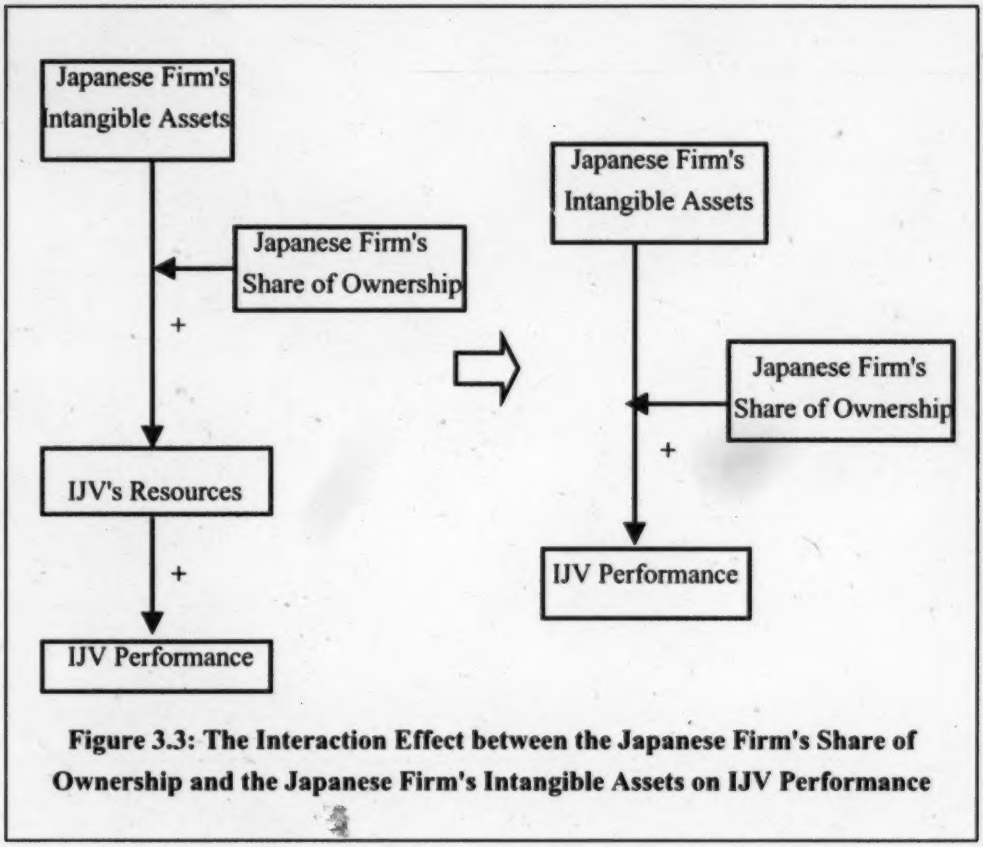


Figure 3.3: The Interaction Effect between the Japanese Firm's Share of Ownership and the Japanese Firm's Intangible Assets on IJV Performance

As we mentioned before, the sum of the American firm's share of ownership and the Japanese firm's share of ownership should equal 100 percent. Therefore, the Japanese firm's share of ownership can be expressed in terms of its American partner's share of ownership. The larger the American firm's share of ownership, the smaller the share of ownership the Japanese firm may acquire. Thus, the positive interaction effect between the Japanese firm's share of ownership and the Japanese firm's intangible assets on IJV performance illustrated in Figure 3.3 can be re-framed as a negative interaction effect between the Japanese firm's intangible assets and the American firm's share of ownership on IJV performance. This relationship is demonstrated by Figure 3.4.

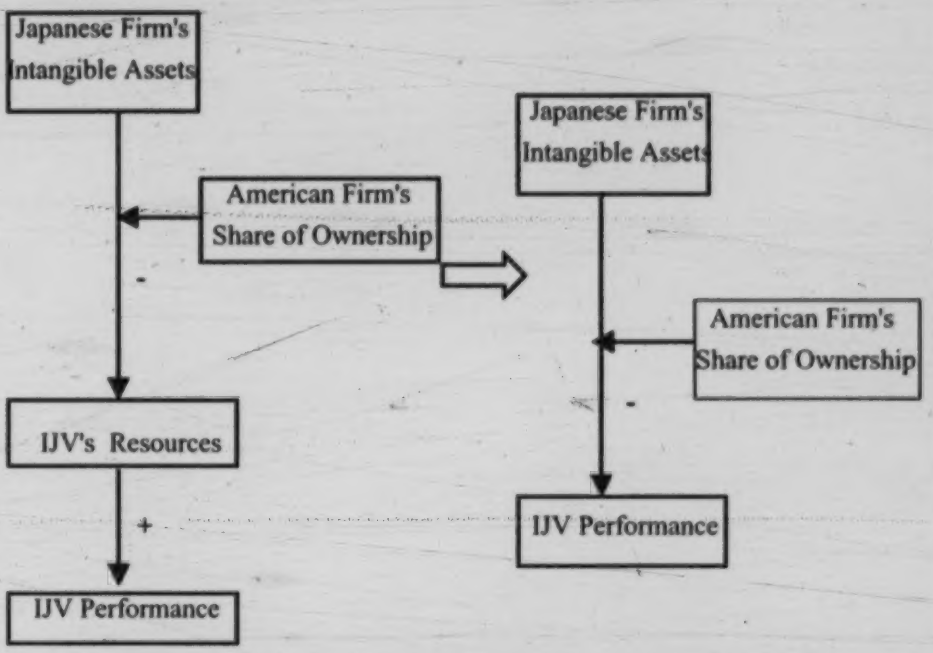


Figure 3.4: The Interaction Effect between the American Firm's Share of Ownership and the Japanese Firm's Intangible Assets on IJV Performance

Based on the above discussions, we formulate the following hypotheses:

H2a: The Japanese firm's intangible assets and the Japanese firm's share of ownership have a positive interaction effect on the IJV's growth in sales and productivity, that is, the Japanese firm's intangible assets and the American firm's share of ownership have a negative interaction effect on the IJV's growth in sales and productivity.

Specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the Japanese firm's intangible assets on the IJV's growth in sales and productivity will decrease.

H2b: The Japanese firm's intangible assets and the Japanese firm's share of ownership have a positive interaction effect on the IJV's revenue and profit, that is, the Japanese firm's intangible assets and the American firm's share of ownership have a negative interaction effect on the IJV's revenue and profit.

Specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the Japanese firm's intangible assets on the IJV's revenue and profit will decrease.

H2c: The Japanese firm's intangible assets and the Japanese firm's share of ownership have a positive interaction effect on the IJV's growth in profit, that is, the Japanese firm's intangible assets and the American firm's share of ownership have a negative interaction effect on the IJV's growth in profit.

Specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the Japanese firm's intangible assets on the IJV's growth in profit will decrease.

H2d: The Japanese firm's intangible assets and the Japanese firm's share of ownership have a positive interaction effect on the IJV's productivity, that is, the Japanese firm's intangible assets and the American firm's share of ownership have a negative interaction effect on the IJV's productivity.

Specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the Japanese firm's intangible assets on the IJV's productivity will decrease.

Chapter IV

Other Determinants of IJV Performance

Previous research suggests that country factors (Gatignon & Anderson, 1988), industry factors (Harrigan, 1985), firm size (Kogut, 1988), IJV age (Nakamura, 1991), localization (Yoshihara, 1996), and industry relatedness (Rumelt, 1974) may also affect the IJV's performance. In this chapter, we discuss these factors in turn.

4.1 Country Factors

The influence of country factors on IJV performance is multidimensional. First, country factors may affect IJV performance through Porter's (1980, 1990) "five forces of competition" and through country specific resource endowments. Secondly, country factors may affect IJV performance by influencing the foreign firm's willingness to transfer its resources. This may be reflected in the form of country-specific risk (Gatignon & Anderson, 1988), a country's attitude and regulation regarding the IJVs (Gomes-Casseres, 1989, 1990), socio-cultural distance (Gatignon & Anderson, 1988; Kogut & Singh, 1988; Chu & Anderson, 1992) and the parent firm's preference for specific ownership structures (Erramilli, 1996).

Country risk is defined as the external uncertainties existing in a given country (Gatignon & Anderson, 1988). It has been operationalized as environmental volatility (Erramilli & Rao, 1993), the risk of expropriation/repatriating and the general stability of political, social, and economic conditions (Agarwal & Ramaswami, 1992; Kim & Hwang, 1992). Conceivably, the foreign firm is less willing to transfer their resources to countries with high country risk. Increased country risk generally favors shared ownership (Gatignon & Anderson, 1988) and reduces the foreign parent firm's willingness to transfer its resources.

The host country's attitude and regulations towards a particular ownership structure affect the foreign firm's choice among alternative ownership structures. Some host countries prohibit majority foreign ownership; some countries require prior governmental approval for establishing such ownership structures, while other countries take neutral positions regarding foreign ownership in most local industries except for "strategic" ones (Gomes-Casseres, 1989, 1990). The influence of these government policies on the IJV's ownership structure is self-evident. Since the foreign firm's willingness to transfer its resources will be reduced if it could not acquire its desired level of ownership and control, the host country's attitude towards and regulation of the IJV will affect the foreign firm's willingness to transfer its resources.

Country factors may also function in the form of socio-cultural distance (Gatignon & Anderson, 1988; Kogut & Singh, 1988; Chu & Anderson, 1992). Cultural distance influences the firm's perception of the costs and uncertainty associated with different ownership structures. Generally, the costs and uncertainty are perceived as being greater in culturally dissimilar host countries (Kogut & Singh, 1988). Since the foreign firm is less willing to transfer its resources to countries that are associated with high costs and high uncertainties, larger socio-cultural distance will reduce the foreign parent firm's willingness to transfer resources.

Finally, country factors may influence IJV performance through the foreign parent firm's preference for specific ownership structures. A repeated observation is that The American firm has a penchant for sole ownership or majority ownership when sole ownership is not possible (e.g., Shetty 1979; Gatignon & Anderson, 1988). This preference may have roots in some nationality traits that are unique to the American firm (Erramilli, 1996). Research indicates that there are psychological motivations behind the American manager's preference for dominant control and there is a pattern of being more comfortable and more satisfied when dominant control is maintained in the IJV (Osland & Cavusgil, 1996). This implies that with the same share of

ownership, the American firm may feel less comfortable and is thus less willing to transfer its resources compared to the firm from other countries.

In this study, the effect of country factors is controlled by focusing on the American firm's IJVs in Japan.

4.2 Industry Factors

The influence of industry factors on IJV performance is twofold. First, as country factors, industry factors may affect IJV performance through Porter's (1980) "five forces of competition". Secondly, industry factors may affect IJV performance by influencing the foreign firm's willingness to transfer their resources.

There is a well-developed industrial economics theory that seeks to explain variations in ownership patterns across different industries (Dunning, 1993). According to this theory, industries are different in terms of product differentiation, technical capacity, skill intensity, capital requirements and scale economies (Dunning, 1993; Rathayake, 1993; Aswicahyono & Hill, 1995; Hagedoorn & Narula, 1996). These differences tend to influence the IJV's ownership structures (Hladik, 1985; Hagedoorn, 1993; Harrigan, 1985; Link & Bauer, 1989; Auster, 1992; Dunning, 1993). For example, several studies found that in highly concentrated industries (oligopolies), the investing firm tends to favor large share of ownership (Graham, 1985; Vernon, 1985; Casson, 1987). By contrast, in highly competitive industries, trained and knowledgeable managers are abundant and the investing firm can obtain local contracts with sufficient knowledge and skill and thus has reduced need for control (Anderson & Gatignon, 1986). In these industries, the investing firm is more likely to use low control modes to expand internationally (Harrigan, 1985; Anderson & Gatignon, 1986, Gomes-Casseres, 1990). Therefore, with the same share of ownership, the foreign firm may feel more comfortable when investing in highly

competitive industries than in highly concentrated industries. Thus, the foreign firm's willingness to transfer resources may vary depending on the industries.

In this study, we will use discriminant analysis and cluster analysis to examine the differences among different industries. Initially, the industry factors are controlled for by focusing on the IJV in the manufacturing sector. Then, analysis will be conducted separately for the three different industries.

4.3 Firm Size

In the Japanese market, there exist many barriers that impede the American firm's penetration (Kearney, 1991; Sako, 1992). The American firm must own sufficient resources to overcome the skyrocketing land prices, to achieve economies of scale, and to absorb the high costs associated with marketing and the enforcement of patents and contracts (Hood & Young, 1979). Previous research indicates that the firm's size is a good indicator of its capability to absorb the costs associated with market entry (Buckley & Casson, 1976; Kumar, 1984; Caves & Mehra, 1986; Yu & Ito, 1988; Terpstra & Yu, 1988; Kimura, 1989) and the big firm is more likely to possess the necessary experience for foreign operations than smaller firms (Bartlett, 1986; Bartlett & Ghoshal, 1986; Doz, Prahalad & Hamel, 1988). Therefore, the big American firm can accelerate the IJV's process of market penetration and facilitate the IJV's efficiency improvement. Hence, we hypothesize:

H3a: The American firm's size should be positively related to the IJV's growth in sales and productivity.

H3b: The American firm's size should be positively related to the IJV's revenue and profit.

H3c: The American firm's size should be positively related to the IJV's rate of growth in profit.

H3d: The American firm's size should be positively related to the IJV's productivity.

In Japan, the big Japanese parent firm is more likely to possess more local connections and better reputations than the smaller Japanese firm. This makes it easier for the IJV to set up local business connections and recruiting skillful employees. Therefore, the Japanese parent firm's size should contribute positively to the IJV's performance. Hence, we hypothesize:

H4a: The Japanese firm's size should be positively related to the IJV's growth in sales and productivity.

H4b: The Japanese firm's size should be positively related to the IJV's revenue and profit.

H4c: The Japanese firm's size should be positively related to the IJV's rate of growth in profit.

H4d: The Japanese firm's size should be positively related to the IJV's productivity.

The IJV's size also has several important implications for IJV performance. First, size is often used as an indicator of the economies of scale. Organizational scientists found that as the organization's size increases, its extent of specialization, standardization and formalization will increase correspondingly (Lawrence & Lorsch, 1967). Consequently, the employees' special capabilities and skills can be cultivated and utilized to enhance the IJV's efficiency. As the IJV's size increases, fixed cost can

be allocated to increased volume of sales, which also help to improve the IJV's efficiency. For the big IJV, it also becomes possible that economies of scope can be realized in the areas of marketing, advertising, purchasing and R&D (Grant, 1995), which should also enhance the IJV's efficiency. Further, Turban and Keen (1993) suggest that large organizations tend to be more attractive to potential employees. Thus, it is easier for the big IJV to attract skillful employees and achieve higher productivity and profitability. Finally, it is self-evident that the IJV's size should be positively related to the IJV's net profit, taxable income and sales. Hence, we formulate the following hypothesis:

H5a: The IJV's size should be positively related to the IJV's revenue and profit.

H5b: The IJV's size should be positively related to the IJV's productivity.

4.4 IJV Age

The IJV's age refers to the time elapsed since it was established. IJV age can influence IJV performance in several ways. First, the IJV tends to have a larger market to penetrate and have more room for improvement in efficiency at its early stage of development. As the IJV ages, there will be less unfilled market to penetrate and the IJV's improvement in efficiency will slow down. Second, the older IJV is able to move further down the learning curve and operates at relatively high efficiency (Grant, 1995). Third, the older IJV tends to have well-established reputations and brand recognition. This gives the older IJV a competitive edge over the new IJV in terms of differentiation advantage (Porter, 1990). Therefore, the older IJV is more efficient and profitable than the new IJV. Thus, we formulate the following hypothesis:

H6a: The IJV's age should be negatively related to the IJV's growth in sales and productivity.

H6b: The IJV's age should be positively related to the IJV's revenue and profit.

H6c: The IJV's age should be negatively related to the IJV's rate of growth in profit.

H6d: The IJV's age should be positively related to the IJV's productivity.

Finally, IJV age has an important impact on IJV performance at the IJV's startup stage. During this period, the new venture needs time to install equipment, train employees and implement other aspects of the investment plan. This makes the IJV's performance very unstable (Woodcock et. al., 1994). Woodcock and his colleagues suggest that the IJV's performance tends to increase and stabilize after a breaking point, which is approximately two years. In order to improve the validity of our study, we plan to remove from our sample the IJVs that are less than five years old.

4.6. Localization

Recently, the issue of localization has been attracting more and more attention in academic circles (Peterson et al., 1996; Yoshihara, 1996). This issue is even more crucial in the case of the American firm's IJVs in Japan. In Chapter 3, we briefly discussed the uniqueness of business practices in Japan. Both academic and trade publications suggest that it is a much more complex task to do business in Japan (than in the United States). For instance, Japanese customers never pay cash for what they buy. The most common payment term is a 120 days credit note issued 40 to 60 days after delivery. This can only function in a closed-loop system such as Japan's (Takada, 1998). Under such circumstances, local Japanese are much more likely than foreigners

to have the personal connections that are essential to do business in Japan. They have the sort of insider's knowledge that saves the American firm from making crass mistakes. Therefore, the more local executives the IJV hires, the easier it will be for the IJV to penetrate the Japanese market, to improve productivity and to achieve higher profitability. Hence, we hypothesize:

H7a: The percentage of Japanese executives hired by the IJV is positively related to the IJV's growth in sales and productivity.

H7b: The percentage of Japanese executives hired by the IJV is positively related to the IJV's revenue and profit.

H7c: The percentage of Japanese executives hired by the IJV is positively related to the IJV's rate of growth in profit.

H7d: The percentage of Japanese executives hired by the IJV is positively related to the IJV's productivity.

4.7. Industry Relatedness

In the strategy literature, a major stream of research deals with the impact of the firm's diversification strategy on its performance. According to these researches, when a firm decides to expand its business, it will enjoy higher levels of performance if it expands into related industries, compared to expansion into unrelated industries (Rumelt, 1974). The theoretical arguments are that expansion into related business can have a positive impact on performance by allowing the firm to make better use of the resources of a core business (Penrose, 1959; Rumelt, 1974) or to share resources

across businesses (Chatterjee & Wernerfelt, 1991; Teece, 1982; Wernerfelt, 1984; Wernerfelt & Montgomery, 1986, 1988). Therefore, we hypothesize:

H8a: Industry relatedness should be positively related to the IJV's growth in sales and productivity.

H8b: Industry relatedness should be positively related to the IJV's revenue and profit.

H8c: Industry relatedness should positively related to the IJV's rate of growth in profit.

H8d: Industry relatedness should be positively related to the IJV's productivity.

Based on the above discussions, we introduce a comprehensive theoretical model for IJV performance. This model is illustrated in Figure 4.1.

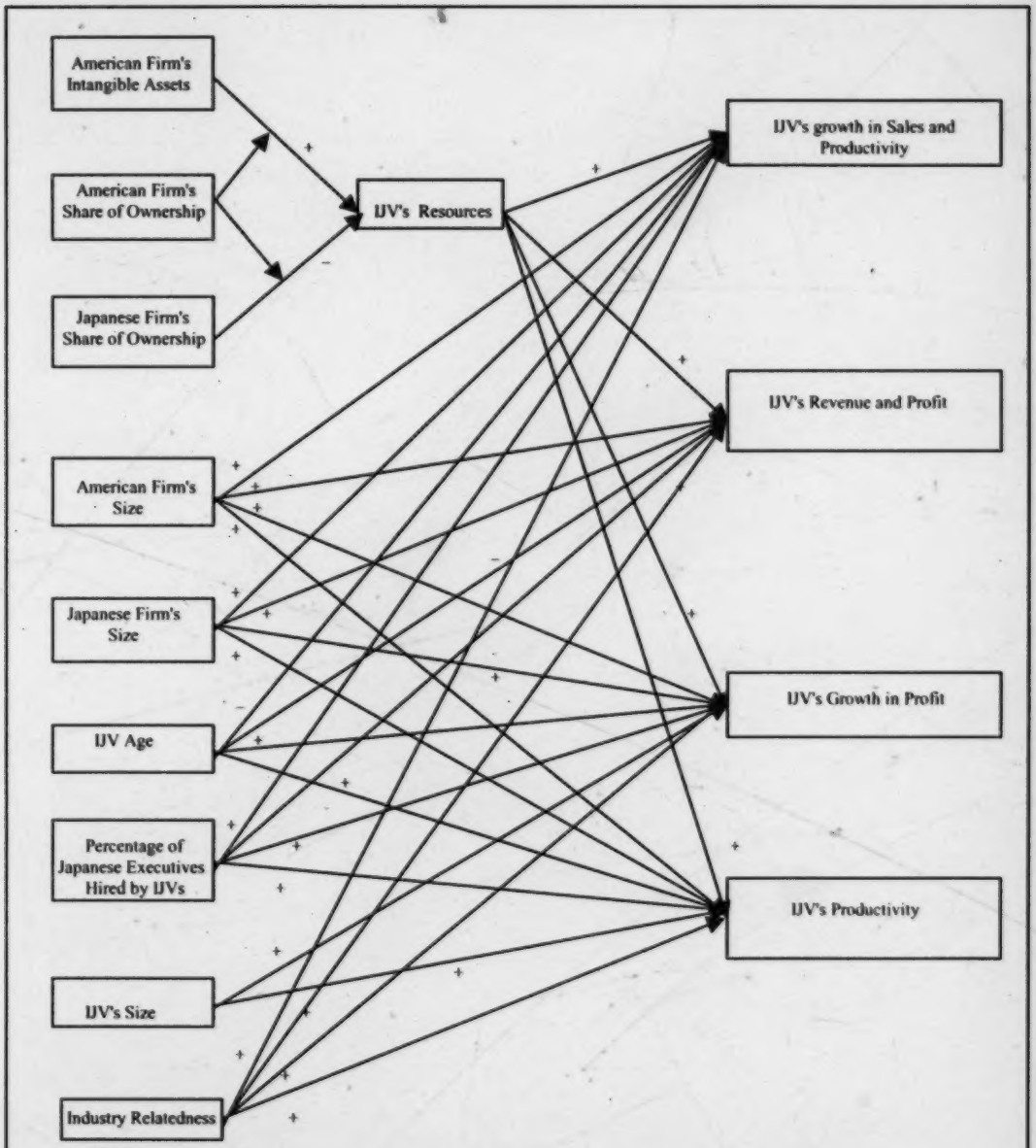


Figure 4.1: A Comprehensive Theoretical Model for IJV Performance

Chapter V

Research Methodology

This chapter outlines the research methodology used in this study. It describes the general approach and reports data sources, operationalization of concepts and data analysis techniques.

5.1 General Approach

In this study, hypotheses are tested using a combination of cross-sectional and longitudinal methodologies. In order to remove the influence of short-term fluctuations, all variables are measured using a five-year average. To avoid the problem of reporting biases, data are collected from multiple sources and are crosschecked. Further, to determine the common dimensions underlying IJV performance and to remove measurement errors (Hayduk, 1987), an exploratory factor analysis is conducted over the twelve indicators of IJV performance.

5.2 Operationalization of Constructs

5.2.1 Dependent Variables

Given the inherent flaws of single IJV performance measures, we use multiple measures of IJV performance in the present study. These measures include: IJV sales (JVS), net profit (NP), taxable income (TI), labor productivity (LP), capital productivity (CP), return on capital (CR), growth in sales (SG), growth in net profit (PG), growth in taxable income (TG), growth in labor productivity (GLP), growth in capital productivity (GCP) and growth in return on capital (GR), and Tobin's Q (Q).

IJV sales represents the IJV's gross sales reduced by cash discounts, trade discounts, and returned sales. The IJV's net profit reports the IJV's fiscal income or loss after subtracting expenses and losses from all revenues and gains. It is calculated by adding operating income, non-operating income, extraordinary income, and deducting corporate income tax, inhabitants tax and other taxes (Japanese Institute of Certified Public Accountants, 1987). Taxable income is calculated by adding operating income, non-operating income, extraordinary income, and deducting deductibles (Japanese Institute of Certified Public Accountants, 1987). Labor productivity is the ratio of the IJV's sales to its number of employees (Harper, 1984). Capital productivity is the ratio of the IJV's sales to the IJV's capital (Harper, 1984). Return on capital is calculated by dividing the IJV's net profit by the IJV's capital. Growth in sales is measured by the IJV's annual percentage increase in sales. Growth in net profit is the IJV's annual percentage increase in net profit. Growth in labor productivity is the IJV's annual percentage increase in labor productivity. Growth in capital productivity is the IJV's annual percentage in capital productivity. Growth in taxable income is the IJV's annual percentage increase in taxable income. Growth in return on capital is the IJV's annual percentage increase in return on capital.

All these variables are measured using a five-year average. Further, exploratory factor analysis using principal components with varimax rotation reveals four distinct performance dimensions: one factor (F1) is the dimension underlying the IJV's growth in sales, growth in labor productivity and growth in capital productivity; one factor (F2) represents the IJV's sales, net profit and taxable income; the third factor (F3) is the dimension underlying the IJV's growth in net profit, and growth in return on capital; the fourth (F4) underlies the IJV's labor productivity and capital productivity.

In the factor analysis, a variable's communality score denotes the proportion of its variance explained by the selected number of factors (Jobson, 1992b: 374). Using the four factors, the communalities for the 12 performance measures are IJV sales

(0.65), net profit (0.94), taxable income (0.95), labor productivity (0.68), capital productivity (0.58), return on capital (0.10), growth in sales (0.99), growth in net profit (0.99), growth in taxable income (0.02), growth in labor productivity (0.97), growth in capital productivity (0.99) and growth in return on capital (0.94). Thus, according to the communality scores, 99 percent variation in the IJV's growth in capital productivity is explained by the first four factors, whereas for growth in taxable income, the first four factors can only explain 2 percent of variance. Overall, the four factors accounted for 72.925 percent of the total variation. The result is quite satisfactory. Therefore, we regard these factors as four distinct dimensions of IJV performance and will use them as dependent variables in the following regression analysis.

In order to capture the IJV's contribution to the American firm's value, Tobin's Q is calculated for the American firm. Tobin's Q is a financial market-based measure of firm value. It equals the ratio of the firm's market value to the replacement cost of its physical assets[1] (Morck & Yeung, 1991).

5.2.2 Independent Variables

Intangible Assets

In the FDI literature, a commonly accepted measure of the firm's intangible assets is the firm's R&D intensity (Hennart, 1988; Morck & Yeung, 1991; Chauvin & Hirschey 1993). In the present study, both the American and the Japanese firm's intangible assets are measured by their respective average R&D expenditure/sales ratio (RAD, JRAD) over the period of 1980-1984.

[1] The numerator of Q is the American firm's market value, defined as the sum of the actual market value of common stock, the estimated market value of preferred stock, book value of long-term debt, and short-term liabilities net of short-term assets. The denominator of Q is the replacement cost of the American firm's plant and inventories.

Firm Size

Two widely accepted measures of firm size are the firm's sales and the firm's number of employees (Aulakh et al., 1998; Contractor & Kundu, 1998). In this study, both the American firm's and the IJV's size are measured by the log transformation of their number of employees (EMP, NOEMP). The Japanese parent firm's size is measured by the log transformation of its sales volume (JSALE). The data on the Japanese parent firm's number of employees is not available.

Ownership

Table 5.1: Dummy Variables for Ownership

	O1	O2	O3
American firm's share of ownership < 50%	1	0	0
American firm's share of ownership = 50%	0	1	0
American firm's share of ownership > 50%	0	0	1

In the present study, three dummy variables: O1, O2 and O3 are used to operationalize the concept of ownership. As illustrated in Table 5.1, O1 is coded as one if the American firm's share of ownership is smaller than 49 percent, and is coded zero otherwise. O2 is coded as one if the American firm and its Japanese partner split the ownership, and is coded zero otherwise. O3 is coded as one if the American firm's share of ownership falls between 50 percent and 99 percent, and is coded zero otherwise. In other words, when O1 is one, the American firm takes the minority position in the IJV and its Japanese partner is the majority owner. The Japanese firm is the minority owner and the American firm is the majority owner when O3 equals one.

The Japanese firm and the American firm have equal shares of ownership when O2 equals one.

IJV Age

IJV age (AGE) is measured by the square root of the time elapsed since the IJV is established.

Localization

The extent of localization is measured by the percentage of local Japanese executives among the IJV's executives (JRAT).

Industry Relatedness

Industry relatedness is measured by three dummy variables. Rcode1 measures the industry relatedness between the IJV and its American parent firm. Rcode2 measures the industry relatedness between the American parent firm and its Japanese partners. Rcode3 measures the industry relatedness between the IJV and its Japanese parent firm. They are coded as one if the industries are related, and zero if the industries are unrelated.

5.3. Data Sources

In the present study, data are drawn from several sources. Data on the IJV mainly come from Toyo Keizai's (1991) dataset on foreign affiliated firms in Japan. This information has been published annually since 1970. Although it has not been used extensively by researchers perhaps because it is published in Japanese, the Toyo

Keizai survey is enjoying increasing acceptance among academic researchers (Makino & Delios, 1996). The information provided by this survey is compiled from publicly available information and from a survey of the top Japanese managers in each foreign affiliated firm (Toyo Keizai, 1991).

The data used in the present study come from a survey conducted by Toyo Keizai in December 1990. It provides information on the IJV for the period of 1985-1990. The questionnaire was sent to 3635 companies. Among them 2344 companies responded. The response rate is 64 percent, which is quite high according to the standard of this type of research. Information on some of the nonrespondent companies was supplemented from published information. This increased the number of companies to 3088, which covers 85 percent of the sample. The problem of reporting bias should be limited since in Japan foreign affiliated firms are required by law to provide information and therefore published information is available.

Toyo Keizai's (1991) data may suffer from sampling biases. According to its sampling frame, the foreign affiliated firm would be included if it satisfied any one of the three criteria. The first criterion is that the foreign affiliated firm should have more than 50 million Japanese yen in capital. The second criterion is that the percentage of foreign capital is over 49 percent. The third criterion states that for the foreign affiliated firm whose parent firm is a big firm, or whose parent firm is a public firm, the minimum content of foreign capital is 20 percent. From this sample scheme, it seems that the sample might be biased towards the big foreign affiliated firm, the foreign affiliated firm with a large content of foreign capital, the foreign affiliated firm with a big foreign parent firm, or the foreign affiliated firm with a publicly traded foreign parent firm. However, such biases might not as serious as expected. The calculations done by the BEA staff of the US Department of Commerce show that setting the sample criterion to 10 percent or 20 percent of foreign capital would make a minor impact on the sample of foreign affiliated firms in the U.S.A. (Bureau of Economic Analysis, 1990). Further, one of the thresholds is that the IJV should have

more than 50 million Yen in capital. Since 50 million yen is approximately equivalent to 500,000 U.S. dollars, this is not a big number.

In our sample, we selected the IJV that operates in the manufacturing sector and whose foreign parent firm is an American firm. To make things simpler, the IJVs with three or more than three parents were excluded from the sample. This resulted in a sample of 233 observations. Then the IJV whose age was less than five years was removed from the sample. This reduces the sample size to 217. Finally, we removed outliers and those IJVs whose data are missing. Consequently, the final sample included 191 observations. To further limit the impact of reporting bias, we cross-checked information on the 191 IJVs with Business Intercommunications Inc.'s Directory of Foreign Affiliated Enterprises in Japan (1991).

Data on the American firm are collected from COMPUSTAT, Compact Disclosure and Edgar Plus databases. COMPUSTAT is compiled by Standard & Poor Company. It includes accounting and financial data for over 6,000 public corporations that have their shares traded on the New York, American, NASDAQ, and over-the-counter (OTC) stock exchanges. In their evaluation of various archival data sources, Davis and Duhaime (1992) conclude that COMPUSTAT database is a very useful but under exploited source of archival financial data. COMPUSTAT offers data for every year since 1978.

Compact Disclosure is a dataset offered by Disclosure Corporate. It contains information on 11,000 publicly traded corporations in the Unite States. Edgar Plus is another dataset offered by Disclosure Corporation on the LEXIS-NEXIS platform

Data on the Japanese parent firm are drawn from the DataStream database, Japan Company Handbook (1985-1989), Japanese Companies (1983-1988) and the online Worldscope database. DataStream is an online information service offered by DataStream International that provides the investment industry with comprehensive financial and economic information, both historical and real-time. At present, over 5,000 organizations in 52 countries depend on the information provided by

DataStream. Japan Company Handbook is compiled by Toyo Keizai Shiposha and includes accounting and financial data for over 2,000 public corporations that have their shares traded on the Tokyo and over-the-counter (OTC) stock exchanges. Worldscope Global is a dataset provided by Disclosure Corporation, which derives information from corporate annual reports, disclosure statements, newspapers and wire services. Japanese Companies is compiled by Nihon Keizai Shimbun (1983-1988) Inc. It covers more than 900 publicly traded Japanese companies.

It is worth noting that information on the IJV, information on the American firm and information on the Japanese parent firm have been crosschecked among different sources of data. Further, for the convenience of drawing causal relationships, variables on the American firm and its Japanese partner are measured with a five-year average for the period of 1980-1984, which precedes the period of 1985-1989, from where the data on the IJV performance are drawn.

One of our major concerns is about whether the IJV and its parent firm will behave differently during the periods of 1980-1984 and 1985-1989 because of changes in both countries' government policies. We checked the ABI business information database, the LEXIS-NEXIS database and the relevant government publications. We found that in the United States, the major policy change regarding overseas investment occurred in 1996 when the Tax Reform Act was introduced. In Japan, a series of change happened after 1992 when the Keidanren's Committee on International Industrial Cooperation and the Committee of Foreign-Affiliated Corporations jointly established the ad-hoc Committee on FDI and introduced a series of import and FDI promotion measures afterwards. Therefore, we can assume that during our sampling period, the influence of these two countries' government policies on our sample remains unchanged.

5.4 Data Analysis Method

In this study, five statistical methods were used, all based on SAS. First, analysis of the characteristics of the data is conducted with the SAS\ proc univariate procedure.

Then, principal components with varimax rotation is used to conduct factor analysis on the 12 measures of IJV performance. The factor scores generated from these factor analyses are then used as dependent variables in the regression analysis. ANOVA, MANOVA, discriminant analysis and cluster analysis are also performed in order to examine the differences among IJVs in different industry, age and ownership categories. For hypothesis testing, hierarchical regression analyses are conducted with SAS PROC REG procedure.

Finally, in the present study, results significant at the 0.1 level are required to provide empirical support to a hypothesis. Otherwise, results will not be considered statistically significant.

Chapter VI

Sample Characteristics and Descriptive Statistics

In this section, we discuss our sample's characteristics. We focus on the IJV's distribution in terms of industry, size, age, and ownership. We will also briefly discuss differences among the various age and ownership categories.

6.1 Industry Distribution

Table 6.1 shows that major manufacturing industries are represented in our sample. Yet, among 191 IJVs, 131 (68 percent) come from three industries: the chemical and allied product industry (67), the electrical and electronic equipment industry (36) and the machinery industry (28). These three industries are capital-intensive and are high value-added. The significant concentration of IJVs in these three industries is consistent with the importance given to reducing capital investment and risk sharing for the formation of IJVs. The particularly high concentration of IJVs in the chemical and allied product industry (35 percent) may reflect the American firm's dominant competitive advantage in this industry (Westney, 1994).

Table 6.1: The IJV's and Its Parent Firm's Industry Distribution

	IJV	U.S. Firm	Japanese Firm
Chemical and Allied Product	67	55	52
Electrical & Electronic Equipment	36	47	26
Machinery	28	20	19
Nonferrous	13	10	16
Food	8	6	6
Transportation Equipment	8	9	3
Refined Petroleum	7	16	6
Other Manufacturing	6	2	5
Paper Product	5	6	2
Fabricated metal	3	3	8
Textile	3	1	6
Glass	3	1	6
Clay	2	2	0
Rubber	1	3	3
Furniture	1	1	0
Mining	0	3	1
Business Service	0	1	0
Retail	0	2	1
Agriculture	0	1	0
Entertainment	0	1	0
Utility	0	1	0
Wholesale	0	0	18
Banks, insurance & security	0	0	12
Real Estate	0	0	1

Table 6.2 demonstrates the industry relatedness among the IJV, its American parent firm, and its Japanese parent firm. It seems that a majority of the IJVs (135 and 70 percent) are in industries that are closely related to that of the American parent firm, or that of the Japanese parent firm. Most often, the industries of the American firm and its Japanese partner are not closely related. A careful look at the data indicates that this is caused by the active involvement of wholesale firms (18), banks,

insurance and security firms (12) on the Japanese side. This reflects the American firm's demand to access local financing and local distribution channels.

Table 6.2: Industry Relatedness

	U.S. Firm vs. IJV	U.S. Firm vs. Jap.	Jap. Firm Vs. IJV
Related	135 (70%)	93 (49%)	110 (58%)
Unrelated	56 (30%)	98 (51%)	81 (42%)

6.2 Size Distribution

Table 6.3: The IJV's, American Firm's, and Japanese Firm's Size Distribution

Size of U.S. Firm (No. Employees)	%	Size of IJV (No. of Employees)	%	Size of Japanese Firm (Sales: Million Yen)	%
10-2190	10.5	3-30	10.9	13.315-98.689	15.2
2320-12900	20.4	32-92	27.1	124.901-287.548	30.3
13590-56030	42.4	100-950	47.4	293.400-961.800	38.8
60400-14283	20.4	1000-18831	13.6	1031.075-4844.000	9.4
19130-808320	6.3			13300-124510.846	6.3

Table 6.3 presents the size distribution for the IJV, the American parent firm, and the Japanese parent firm. It seems that despite Toyo Keizai's sampling frame, firms of various size are well represented in our sample. For instance, small American firms that have 10 to 2,190 employees take up 10.5 percent of the total sample. Extra large American firms amount to 6.3 percent of the sample. Medium to large sized American firms form the majority of the sample. In terms of the Japanese firm, small Japanese firms whose sales range from 13.315 to 98.689 million yen take up 15.2 percent of the sample. Extra large Japanese firms amount to 6.3 percent of the total sample. Particularly, small IJVs that have 3 to 92 employees amount to 38 percent of the sample. IJVs that have 1000 to 18,831 employees only take up 13.6 percent of the total sample, and medium sized firms account for 47.4 percent of the sample.

Therefore, we can conclude that the sample in the present study is not particularly biased toward big firms.

6.3 Age Distribution

In our sample, the IJV's age ranges from 5 years to 74 years (IJVs that are less than five years old have been removed from the sample). Although IJVs of various ages are represented in the sample, most IJVs are 5 to 30 years old, which reflects the surge in international joint venturing in the past three decades. The data also indicate that old IJVs tend to be set up by big American firms. For instance, Mazda Motor Corp was set up by Ford Motor Co. and Sumitomo Bank, Ltd., Nippon Otis Elevator Co. was established by United Technologies Corp. and Matsushita Electric Industrial Co., Ltd. The size of the American parent firms for the top ten oldest IJVs ranges from $5,169 million to $101,759 million in sales, and their number of employees ranges from 31,820 to 808,320.

Table 6.4. Characteristics of the IJV: Age

Mean: 22.1 Standard deviation: 13.3

IJV Age	%
5-10	22.0
11-20	29.3
21-30	31.4
31-74	16.3

Table 6.5 presents the individual mean values for each of the eleven variables for the four age categories. This table also provides the univariate ANOVA results for each of the items. From this table, we can see that ten out of the eleven items are significantly different across the four age categories.

Table 6.5. Summary of Item Means by Age Categories with ANOVA Statistics

Variables	Group Means					
	5-10	11-20	21-30	31-74	F	p-Value
Ownership	0.544	0.507	0.510	0.412	9.35	0.000
IJV's No. of Employees	1.929	1.990	2.370	2.954	23.04	0.000
Percentage of Jap. Executives	0.694	0.663	0.719	0.862	12.02	0.000
US. Firm's No. of Employees	1.163	1.253	1.391	1.695	4.15	0.007
Jap. Firm's Sale	8.503	8.429	8.613	8.838	2.89	0.037
US. Firm's R&D Intensity	0.054	0.029	0.033	0.031	5.54	0.001
Jap. Firm's R&D Intensity	0.048	0.045	0.045	0.023	2.49	0.062
Growth in Sales & Productivity*	0.678	-0.039	-0.209	-0.459	11.16	0.000
Revenue & Profit*	-0.189	-0.266	-0.084	0.832	11.15	0.000
Growth in Profit*	0.530	-0.123	-0.245	0.071	5.62	0.001
Productivity*	0.023	-0.160	0.099	0.089	0.77	0.514

* Standardized factor scores are presented.

According to this table, for a new IJV that is 5 to 10 years old, its American parent firm tends to have a higher level of R&D intensity than that of the old IJV. Consistent with entry mode research, the American parent firm of the new IJV also tends to have a larger share of ownership. In comparison, the old IJV tends to have a big American parent firm. This is understandable since the earlier entrant tends to face higher barriers in the Japanese market and only the big American firm has sufficient resources to cover the high cost. It is also interesting to note that for the older IJV, both its American parent firm and its local Japanese parent firm tend to have a lower level of R&D intensity. This might have happened just because of historical coincidence. However, another possible explanation is that these firms might have deliberately chosen the option of international expansion in order to strengthen their competition.

This table also shows that the new IJV tends to have a higher rate of growth in sales and productivity and a higher rate of growth in profit. This is consistent with the predictions made by Hypothesis H1a and H1c. According to Hypothesis H1a and H1c, there should exist a positive interaction effect between the American firm's R&D intensity and the American firm's share of ownership on the IJV's growth in profit and the IJV's growth in sales and productivity. Since Table 6.5 indicates that the American

parent firm of the new IJV tends to have a higher level of R&D intensity and a larger share of ownership, therefore, the new IJV should have a higher rate of growth in profit and a higher rate of growth in sales and productivity. Further, Hypothesis H6a and H6c suggest that the new IJV should have a higher rate of growth in sales and productivity and a higher rate of growth in profit since it has a larger market to penetrate and has more rooms to improve. Therefore, such finding is also consistent with Hypothesis H6a and H6c.

Consistent with Hypothesis H6b, this table also shows that the old IJV tends to have more revenue and profit. Finally, it is apparent from this table that the old IJV tends to hire more local Japanese executives.

6.4 Ownership Distribution

Table 6.6 presents the distribution of the American firm's share of ownership. It seems that our sample is not biased toward the IJV in which the American firm takes a majority ownership position. In fact, Table 6.6 indicates that in our sample there are more IJVs in which the American firm takes a minority position (28.3 percent) than there are IJVs where the American firm's share of ownership is more than 50 percent (21.5 percent). In addition, the proportion of the 50/50 IJVs amounts to 50.2 percent of the total sample, which is consistent with the findings of Contractor (1989).

Table 6.6. Characteristics of the IJV: American Firm's Share of Ownership
Mean: 50% Standard deviation: 12%

American Firm's Ownership	%
15% - 35%	9.9
37% - 49.2%	18.4
50%	50.2
51% - 70%	14.7
71% - 96.2%	6.8

Table 6.7 summarizes the individual mean values for each of the eleven variables. This table also provides the univariate ANOVA results for each of the items. From this table, we can see that nine out of the eleven items are significantly different across the three ownership categories.

Table 6.7. Summary of Item Means with ANOVA Statistics

Variables	Group Means				
	Minority	Shared	Majority	F	p-Value
IJV Age	4.964	4.34	4.201	4.68	0.010
IJV's No. of Employees	2.435	2.173	2.246	2.45	0.089
Percentage of Jap. Executives	0.776	0.695	0.713	4.15	0.017
US. Firms' No. of Employees	1.545	1.244	1.356	3.15	0.045
Jap. Firms' Sale	8.648	8.469	8.722	2.56	0.080
US. Firms' R&D Intensity	0.024	0.036	0.055	11.34	0.000
Jap. Firms' R&D Intensity	0.048	0.038	0.041	0.88	0.419
Growth in Sales & Productivity*	-0.564	0.087	0.504	16.36	0.000
Revenue & Profit*	0.047	0.002	-0.076	0.18	0.839
Growth in Profit*	0.087	-0.134	0.272	2.49	0.086
Productivity*	-0.089	-0.213	0.636	11.91	0.000

* Standardized factor scores are presented.

According to Table 6.7, the IJV in which American firm takes the minority position (minority IJV) tends to be old, big, has a big American parent firm, and proportionately hire more local Japanese executives. Consistent with the result of entry mode research, the American parent firm that takes a majority position typically has a higher level of R&D intensity.

We note that the IJV in which the American firm takes a majority position (Majority IJV) typically has a higher rate of growth in sales and productivity, a higher rate of growth in profit, and a higher level of productivity. This is consistent with Hypothesis H1a, H1c and H1d. According to Hypothesis H1a, H1c, and H1d, there should exist a positive interaction effect between the American firm's R&D intensity and the American firm's share of ownership on the IJV's growth rate in sales and productivity, growth rate in profit, and productivity. Since this table indicate that for

the majority IJV, its American parent firm typically has a higher level of R&D intensity and, of course, a larger shares of ownership, it should have a higher rate of growth in sales and productivity, a higher rate of growth in profit, and a higher level of productivity.

In Chapter 5, we mentioned that because of Toyo Keizai's sampling scheme, our sample might be biased towards the large IJV, the IJV that has large American parent firm, and the IJV in which the American firm has a majority stake. After the above discussions, our concern should be alleviated. It seems that the small IJV, the IJV that has small American parent firm, and the IJV in which the American firm takes the minority position are well represented in our sample. The IJV is also well represented in terms of its age and industry. Further, the distribution in our sample is also consistent with the results of United States Department of Commerce' Benchmark Surveys over various years (Contractor, 1990).

Chapter VII

Results of Exploratory Analyses

This chapter reports results of the exploratory analyses. First, since we have twelve indicators of the IJV's performance and the correlation among these variables is high, in Section 7.1, we employ factor analysis as a data reduction technique to obtain a smaller number of new variables that can be used to approximate the IJV's performance. In Section 4.2, we mentioned that there are significant differences among IJVs operating in different industries. We return to this in Section 7.2 and try to determine whether such differences exist in our data. We use MANOVA to test the overall level of differences among the four industry categories and ANOVA is employed to test the differences in specific variables. Then, discriminant analysis is conducted to find out what variables can best characterize the differences among IJVs of different industries. These tests indicate that significant differences do exist among the IJVs of different industries. Therefore, the IJV's industry provides a basis for classifying the IJV into natural clusters. However, the question then arises whether there is an alternative way to classify the IJVs. For this purpose, we conduct cluster analysis in Section 7.3 and try to find another way to classify the IJVs.

7.1 Dimensions of IJV Performance: Factor Analysis

Table 7.1 presents the correlation matrix and descriptive statistics for the twelve indicators of IJV performance. It seems that some indicators of IJV performance are closely correlated. It prompts us to do an exploratory factor analysis in order to find out the distinct dimensions underlying these indicators.

Table 7.1: Correlation Matrix and Descriptive Statistics of Indicators of IJV Performance (N=191)

Variables	MEAN	STD	1	2	3	4	5	6	7	8	9	10	11	12
1. Capital Productivity	29.027	24.328	1.000											
2. Return on Capital	1.323	2.430	0.079	1.000										
3. Growth in Capital Productivity	0.110	0.178	0.227**	0.022	1.000									
4. Growth in Labor Productivity	0.120	0.184	0.224**	0.007	0.977***	1.000								
5. Growth in Return on Capital	0.730	0.980	0.173*	0.049	0.204**	0.200**	1.000							
6. Sales	49836.480	147365.832	0.176*	-0.097	-0.156*	-0.155*	-0.013	1.000						
7. Labor Productivity	119.422	227.783	0.335***	-0.086	0.140*	0.140*	0.129*	0.097	1.000					
8. Net Profit	1083.414	2747.326	0.063	-0.013	-0.050	-0.055	-0.041	0.588***	0.067	1.000				
9. Growth in Net Profit	0.569	0.961	0.041	0.078	0.028	0.029	0.893***	0.025	0.068	-0.030	1.000			
10. Growth in Sales	0.113	0.182	0.245***	0.023	0.993***	0.966***	0.213**	-0.152*	0.151*	-0.037	0.028	1.000		
11. Growth in Taxable Income	0.747	2.834	-0.029	-0.007	-0.033	-0.032	-0.022	0.071	-0.007	-0.021	-0.024	-0.031	1.000	
12. Taxable Income	2269.052	5972.009	0.075	-0.042	-0.036	-0.040	-0.020	0.607***	0.073	0.982***	-0.023	-0.025	0.002	1

* $p < 0.1$

** $p < 0.01$

*** $p < 0.001$

Factor analysis describes the variation among many variables in terms of a few underlying but unobservable random variables called factors, which are assumed to be mutually uncorrelated. Factor analysis can also be viewed as a statistical procedure for grouping variables into subsets such that the variables within each set are mutually highly correlated, whereas at the same time variables in different subsets are relatively uncorrelated (Jobson, 1992b).

Using the principal component approach (Jobson, 1992b, we performed factor analysis over the twelve indicators of IJV performance. The scree test and the eigenvalue-one-criterion (Jobson, 1992b) agree on the four-factor solution. Table 7.2 presents results of the factor analysis based on the four-factor solution with varimax rotation. As shown in Table 7.2, ***growth in capital productivity***, ***growth in labor productivity*** and ***growth in sales*** dominate factor 1. Therefore, factor 1 measures the IJV's overall rate of growth in sales and productivity. It is labeled as ***growth in sales and productivity factor*** (F1). ***Net profit***, ***sales*** and ***taxable income*** load well onto factor 2. These variables measure the IJV's total revenue and profit and therefore factor 2 is labeled as ***revenue and profit factor*** (F2). Factor 3 is dominated by ***Growth in net profit*** and ***growth in return on capital***. Since these two indicators represent growth in the IJV's profit, factor 3 is labeled as the ***growth in profit factor*** (F3). ***Capital productivity*** and ***labor productivity*** dominate factor 4 and therefore factor 4 measures the IJV's overall level of productivity. Thus, factor 4 is labeled as the ***productivity factor*** (F4).

The communality scores of the factor analysis indicate that these four factors are able to explain a large proportion of variance in the IJV's sales, net profit, taxable income, labor productivity, capital productivity, growth in sales, growth in net profit, growth in labor productivity, growth in capital productivity, and growth in return on capital. Overall, the four factors explain 73 percent of the total variance in the IJV's performance. Therefore, we regard these factors as four distinct dimensions underlying the IJV's performance and will use them as dependent variables in later discussions.

Table 7.2: Rotated Factor Pattern* (Loading) For a Four-Factor Solution**
(N=191)

Variables	FACTOR1	FACTOR2	FACTOR3	FACTOR4	Communality
Growth in Capital Productivity	0.991	-0.052	0.055	0.028	0.989
Growth in Labor Productivity	0.982	-0.055	0.050	0.030	0.970
Growth in Sales	0.989	-0.043	0.060	0.044	0.985
Growth in Taxable Income	-0.085	-0.003	-0.055	0.108	0.017
Growth in Net Profit	-0.026	0.003	0.972	-0.047	0.949
Growth in Return on Capital	0.142	-0.010	0.957	0.056	0.941
Net Profit	0.012	0.967	-0.029	-0.023	0.936
Sales	-0.165	0.759	0.026	0.217	0.653
Return on Capital	0.106	-0.033	0.162	-0.244	0.077
Labor Productivity	0.095	0.038	0.103	0.813	0.691
Capital Productivity	0.218	0.092	0.102	0.720	0.590
Taxable Income	0.019	0.972	-0.018	-0.005	0.946
Eigenvalues	3.228	2.486	1.839	1.199	
Variance explained (Percentage)	26.898	20.716	15.321	9.990	
Cumulative variance explained by 4 factors (Percentage):			72.925		

* Rotation Method: Varimax.

** Method: Principal Component.

7.2 Differences among Industries: Discriminant Analysis

In Section 4.2, we discussed in detail the industry factors' influence on IJV performance. Giving this discussion, it is of interest to examine the differences in the IJV's profiles among different industries. According to the distribution of our observations, we classified the IJV into four industry groups: the chemical and allied products industry, which consists 67 observations; the electrical and electronic equipment industry, with 36 observations; the machinery industry, with 28 observations; and the other industry that has 60 observations. In order to examine the industry differences, we conducted MANOVA analysis over the four industry groups. MANOVA uses a statistic called Wilk's Lambda to indicate the differences among different groups (Jobson, 1992b: 216). In this case, differences among the twelve mean

vectors across the four industry groups yield a Wilk's Lambda of 0.54 with an F-statistic of 3.36. Comparison of this F-statistic to the F distribution with 36 and 520.74 degrees of freedom yields a p-value of 0.0001. We can therefore conclude that the IJVs are significantly different among the four industry groups, i.e. there is a significant industry effect.

Table 7.3. Summary of Item Means by Industry Group with ANOVA Statistics

Variables	Group Means					
	Chemical	Electrical	Machinery	Other	F	p-Value
Ownership	0.509	0.531	0.514	0.465	2.90	0.036
IJV Age	4.432	3.918	4.389	4.937	4.34	0.006
IJV's No. of Employees	2.127	2.360	2.194	2.388	1.81	0.147
Percentage of Jap. Executives	0.665	0.758	0.727	0.760	4.34	0.006
US. Firm's No. of Employees	1.432	1.147	1.058	1.527	4.28	0.006
Jap. Firm's Sale	8.534	8.525	8.540	8.664	0.53	0.664
US. Firm's R&D Intensity	0.039	0.065	0.035	0.018	19.54	0.000
Jap. Firm's R&D Intensity	0.042	0.051	0.042	0.035	1.010	0.390
Growth in Sales & Productivity*	-0.113	0.765	-0.033	-0.340	11.11	0.000
Revenue & Profit*	-0.137	0.158	-0.261	0.171	1.98	0.118
Growth in Profit*	-0.019	-0.097	-0.179	0.213	1.26	0.289
Productivity*	-0.056	0.080	-0.159	0.103	0.59	0.623

* Standardized factor scores are presented.

The individual mean values for each of the twelve items are summarized for the four industry groups in Table 7.3. This table also provides the univariate ANOVA results for each of the items. From this table, we can see that the American parent firm's R&D intensity and the IJV's growth in sales and productivity have the largest differences in means among the four industry groups, whereas the Japanese firm's sales and the IJV's productivity have the least differences. Six out of the twelve items have univariate F-statistics with p-values less than 0.1.

While the ANOVA results reveal the differences in specific items, and the MANOVA results indicate the overall level of difference among the different groups, discriminant analyses will show, overall, what differentiates the industry groups. Thus,

we carried out a discriminant analysis for the data. The first two discriminant functions have p-values of 0.0001 and 0.017 respectively. The third discriminant function has a p-value which exceeds 0.3. The standardized coefficients for the first two discriminant functions are summarized in Table 7.4.

Table 7.4. Standardized Coefficients for First Two Discriminant Functions

	Y1	Y2
Ownership	0.301	-0.173
IJV Age	-0.493	-0.136
IJV's No. of Employees	0.117	0.276
Percentage of Jap. Executives	0.236	0.669
US. Firm's No. of Employees	-0.222	-0.415
Jap. Firm's Sale	-0.052	0.037
US. Firm's R&D Intensity	1.086	-0.749
Jap. Firm's R&D Intensity	0.080	0.156
Growth in Sales & Productivity	-0.288	0.859
Revenue & Profit	0.091	0.242
Growth in Profit	-0.401	0.134
Productivity	-0.289	0.288

The first two discriminant functions contrast various groups of variables. Function Y1 contrasts the two sets of items A and B below. The items in A correspond to the variables whose coefficients are positive. They depict aspects of the IJV's profile that are characterized with a higher American firm's R&D intensity, the American parent firm with larger shares of ownership, higher number of the IJV's number of employees, and proportionally higher number of Japanese executives being hired. The items in B correspond to the variables whose coefficients are negative. They depict aspects of the IJV's profile that are associated with older IJV age, smaller number of the American firm's employees, a higher rate of growth in profit, a higher rate of growth in sales and productivity, and a higher level of productivity. The items in A mainly reflect the American firm's higher R&D intensity. The items in B mainly reflect the older IJV that performs well in terms growth in profit, productivity and growth in

sales and productivity. The discriminant function Y1 therefore tends to have a higher value when the items in A are more important than the items in B.

A	B
US firm with higher R&D intensity	older IJV
US firm with larger shares of ownership	higher rate of growth in profit
IJV with higher number of employees	higher levels of productivity
higher percentage of Japanese executives	higher rate of growth in sales and productivity
	US firm with higher number of Employees

Function Y2 contrasts the two sets of items C and D below. The items in C correspond to the variables with positive coefficients. They describe the IJV with a higher rate of growth in sales and productivity, proportionally higher number of Japanese executives, higher levels of productivity, higher number of IJV's employees, more revenue and profit, and Japanese parent firm with a higher R&D intensity. The items in D correspond to the variables whose coefficients are negative. They describe the IJV where the American parent firms have a higher R&D intensity, the American parent firm with a higher number of employees, the American firms with a larger share of ownership, and older IJV. The items in C reflects the IJV that performs well in terms of growth in sales and productivity, productivity, and revenue and profit, and which is big and hires proportionately more Japanese executives. The items in D reflect the old IJV that has a big American parent firm with a higher level of R&D intensity. The discriminant function Y2 therefore tends to have a high value when the items in C are more important than the elements in D.

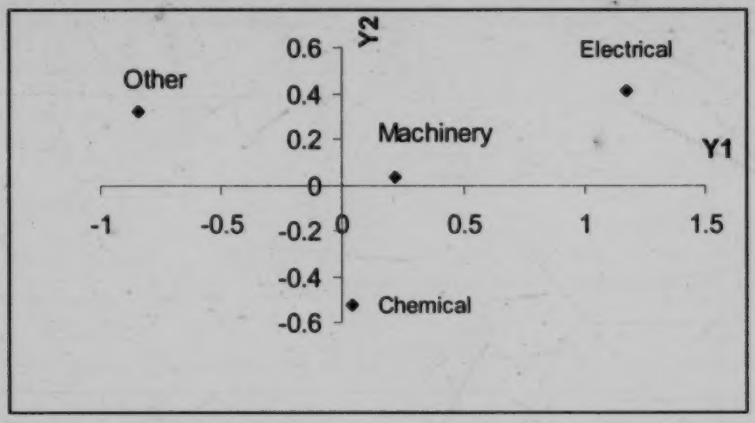
C	D
higher rate of growth in sales and productivity	US firms with higher R&D intensity
higher percentage of Japanese executives	US firms with higher number of employees
higher levels of productivity	US firms with larger shares of ownership
IJV with higher number of employees	older IJVs
more revenue and profit	
Japanese parents with higher R&D Intensity	

For the IJV' in the electrical and electronic equipment industry, its American Parent firm's average R&D intensity and average share of ownership are the highest. The IJV' average number of employees and the average percentage of Japanese executives are the second highest. The IJV is on average the youngest. The American firm' average number of employees and the IJV' average rate of growth in profit are the second lowest. All these factors favor a high value for Y1. Despite the fact that these IJVs have the highest average rate of growth in sales and productivity and the second highest level of productivity, which favor a low value for Y1, there are obviously more factors that favor a high Y1. As a result, the IJVs in the electrical and electronic equipment industry have a high average value for Y1 (1.174). Meanwhile, in the electrical and electronic equipment industry, the IJV has the highest average rate of growth in sales and productivity. It has the second highest average percentage of Japanese executives, the second highest average level of productivity, the second highest average number of employees, and the second highest average level of revenue and profit. Its Japanese parent firm has the highest average level of R&D intensity. In addition, the IJV is on average the youngest and its American parent firm's average number of employees is the second lowest. All these factors favor a high value for Y2. Despite the fact that its American parent firm has the highest average level of R&D

intensity and the largest average share of ownership, which favors a low Y2, it seems that there are many more factors that favor a high Y2. Therefore, the IJV in the electrical and electronic industry also has a high average value for Y2 (0.412).

For the IJV' in the chemical and allied products industry, its American Parent firm's average R&D intensity is the second highest. The IJV's average level of productivity and the IJV's average rate of growth in sales and productivity are the second lowest. These three factors favor a high value for Y1. However, its American parent firm's average share of ownership is small. The IJV's average size and the percentage of Japanese executives are the lowest. The IJV's average age and the American firm's average number of employees rank the second highest. These factors favor a low value for Y1. As a result, the IJV in the chemical and allied products industry has a median average value for Y1 (0.037). Meanwhile, for the IJV in the chemical and allied products industry, its American parent firm has the second lowest average share of ownership. Its Japanese parent firm has the second highest level of R&D intensity. These two factors slightly favor a high value for Y2. However, the IJV has the lowest average percentage of Japanese executives and the lowest number of employees. Its average rate of growth in productivity, its average level of productivity, and its average level of revenue and profit are the second lowest. In addition, the IJV is on average the second oldest and its American parent firm has the second highest level of R&D intensity and the second highest average number of employees. All these factors favor a low value for Y2 and it is obvious that there are fewer factors that favor a high value for Y2 than those that favor a low Y2. Consequently, the IJV has a low average value for Y2 (-0.525).

Figure 7.1. Variation of Industry Group Means for Two Discriminant Functions



For the same reason, the IJV in the machinery industry has a median average value for Y1 (0.215) and a median average value for Y2 (0.036). For the IJV in the congregation of the other industry, its average value for Y1 is low (-0.846). Its average value for Y2, however, is high (0.322). We plotted these values onto the Y1-Y2 plane and Figure 7.1 demonstrates the pattern of variation for the industry group means over the two discriminant functions. It seems that the two discriminant functions successfully differentiate the four industry groups, i.e. the differences in the four industry groups can be depicted very well by the two discriminant functions.

7.3 Another Classifying Scheme: Cluster analysis

In Section 7.2, we discussed differences in the IJV's profiles based on the IJV's industry classification. A question that arises is whether industry is the best criterion for making the classification. In this section, we will see if there is a better way to classify the IJVs. This task is performed by cluster analysis. Cluster analysis classifies a set of objects into groups or clusters in such a way that the profiles of objects in the same cluster are very similar, whereas the profiles of objects in different clusters are

quite distinct (Jobson, 1992b:518). In this study, we carried out the cluster analysis with the SAS program PROC CLUSTER.

We performed twelve cluster analyses with ten methods (Jobson, 1992b). These methods indicate 2, 3, 6, or 8 clusters. Most methods agree at the 3-cluster level, but at the other levels, there is considerable disagreement about the composition of the clusters. Therefore, a 3-cluster solution was chosen. The MANOVA comparison of the twelve mean vectors across the three clusters yielded a Wilk's Lambda of 0.120 with a F-statistic of 27.90. Comparison of this F-statistic to the F distribution with 24 and 354 degrees of freedom yields a p-value of 0.0001. We can therefore conclude that the three clusters are significantly different.

The individual mean values for each of the twelve items are summarized for the three clusters in Table 7.5 This table also provides the univariate ANOVA results for each of the items. From this table, we can see that the three clusters have successfully differentiated the IJVs in terms of ten out of the twelve items. However, the three clusters can only marginally differentiate the IJVs in terms of the American firm's R&D intensity and are unable to differentiate the IJVs in terms of the IJV's rate of growth in profit.

Table 7.5. Summary of Item Means by Clusters with ANOVA Statistics

Variables	Cluster Means				
	Cluster 1	Cluster 2	Cluster 3	F	p-Value
Ownership	0.467	0.512		2.41	0.093
IJV Age	5.373	3.972	6.622	56.53	0.000
IJV's No. of Employees	2.411	2.064	3.566	51.94	0.000
Percentage of Jap. Executives	0.830	0.669	0.893	30.02	0.000
US. Firm's No. of Employees	1.752	1.165	1.944	19.68	0.000
Jap. Firm's Sale	8.884	8.415	9.139	15.91	0.000
US. Firm's R&D Intensity	0.026	0.039	0.039	2.31	0.103
Jap. Firm's R&D Intensity	0.030	0.048	0.015	6.10	0.003
Growth in Sales & Productivity*	-0.544	0.173	-0.090	8.64	0.000
Revenue & Profit*	-0.218	-0.225	2.425	111.30	0.000
Growth in Profit*	-0.229	0.075	-0.056	1.45	0.236
Productivity*	0.671	-0.233	0.272	15.23	0.000

* Standardized factor scores are presented.

In Section 4.2, we mentioned that each industry is associated with some unique characteristics in terms of Porter's five forces of competition, product differentiation, technical capacity, skill intensity, capital requirements and scale economies, which means that the industries are natural clusters. Section 7.2 indicates that the American firm's R&D intensity is the major factor that differentiates the industry groups, which implies that the American firm's R&D intensity is one important dimension that differentiate the natural clusters. Since the American parent firm's R&D intensity is also one of the major concerns of this study, our analyses will be performed based on the IJV's industry classification.

Table 7.6 compared the three-cluster partition with the industry classification. From this table, it seems that a majority of the IJVs in the four industries are sorted into cluster 2. For instance, among the 67 IJVs in the chemical and allied product industry, 51 (76%) are classified into cluster 2. 13 (19%) are classified into cluster 1, and 3 (5%) are classified into cluster 3. 28 (78%) IJVs in the electrical and electronics equipment industry are classified into cluster 2. 3 (8%) are in cluster 1 and 5 (14%) are in cluster 3. 22 (79%) out of the 28 IJVs in the machinery industry are sorted into cluster 2 while 5 (18%) are in cluster 1 and 1 (3%) is in cluster 3. For the 60 IJVs in the remaining industries, 34 (57%) are in cluster 2, 19 (32%) are in cluster 1 and 7 (11%) are in cluster 3. Overall, cluster 2 has 135 IJVs, which make up seventy one percent of the total sample. Cluster 1 has 40 IJVs which account for twenty one percent of the total sample. Cluster 3 has the smallest number of IJVs. Therefore, the partition based on cluster analysis is quite different from the industry classification and it seems that some overlaps exist in terms of the IJV's profiles among different industries.

Table 7.6. The Clusters Partition Versus the Industry Classification

	Chemical	Electrical	Machinery	Other	Total
Cluster 1	13 (19%)	3 (8%)	5 (18%)	19 (32%)	40 (21%)
Cluster 2	51 (76%)	28 (78%)	22 (79%)	34 (57%)	135 (71%)
Cluster 3	3 (5%)	5 (14%)	1 (3%)	7 (11%)	16 (8%)
Total	67	36	28	60	191

Further, according to Table 7.5, the IJVs in cluster 2 are, on average, very young. Their average number of employees is low and proportionately they hire a low average number of local Japanese executives. They have, on average, a high rate of growth in profit, a high rate of growth in sales and productivity, a low level of revenue and profit, and a low level of productivity. Their American parent firms have a high average share of ownership and a low average number of employees. Their Japanese parent firms have a low average volume of sales and a high average level of R&D intensity. For the IJVs in cluster 1, they have a median average age. They also have a median average number of employees and proportionately they hire a median average number of local Japanese executives. They have, on average, a low rate of growth in profit, a low rate of growth in sales and productivity, a low level of revenue and profit, and a high level of productivity. Their American parent firms have a low average share of ownership and a median average number of employees. Their Japanese parent firms have a median average volume of sales and a median average level of R&D intensity. For the IJVs in cluster 3, they have a high average age. They also have a high average number of employees and they proportionately hire a high average number of local Japanese executives. They have, on average, a median rate of growth in profit, a median rate of growth in sales and productivity, a high level of revenue and profit, and a median level of productivity. Their American parent firms have a low average share of ownership and a high average number of employees. Their Japanese parent firms have a high average volume of sales and a low level of R&D intensity.

We took another careful examination of the data. Amazingly, it seems that that cluster 2 (with the majority cases) happens to be a group of young IJVs that coincide with the surge in IJV activities in the past three decades. Cluster 1 happens to be a group of IJVs that are relatively old, and cluster 3 happens to be a group of the oldest IJVs.

Chapter VIII

Results of Regression Analyses

In this chapter, we will use the technique of regression analysis to test our hypotheses. Before we start out to test the hypotheses, first, in Section 8.1 we will discuss the correlation matrix of the dependent and independent variables. Then, in Section 8.2, we will discuss the test results for hypotheses regarding the IJV's growth in sales and productivity. In Section 8.3, we will present the test results for hypotheses regarding the IJV's revenue and productivity. Section 8.4 discusses the test results for hypotheses regarding the IJV's growth in profit. Section 8.5 presents the test results for hypotheses regarding the IJV's productivity. The regression results for the hypotheses regarding contribution to the American firm's value will be presented in Section 8.6.

To test these hypotheses, we first perform regression analyses over the total sample. Because of the industry effect, separate regression analyses will be conducted over the chemical and allied product industry, the electrical and electronic equipment industry, and the machinery industry. We will not perform separate analysis for the other industry group since this industry group is basically a mixture of different industries.

For each hypothesis that is related to the IJV's growth in sales and productivity, the IJV's revenue and profit, the IJV's growth in profit, or the IJV's productivity, we use hierarchical regression analysis in order to isolate the main effects of the American firm's intangible assets and the American firm's share of ownership, the interaction effect between the American firm's intangible assets and the American firm's share of ownership, as well as the effects of firm size, IJV age, localization, and industry relatedness. Our procedure for each of these dependent performance variable is the same. First, we run simple regressions on each independent variable. In the base model presented in step 1, *IJV age*, *Japanese firm's sales*, *American firm's number of*

employees, *the percentage of Japanese executives*, *American firm's R&D intensity* (RAD), *Japanese firm's R&D intensity*, and the three dummy variables for *industry relatedness* are added to the regression equation (*IJV's number of employees* is entered for testing hypothesis related to the IJV's productivity and the IJV's revenue and profit. These variables are entered in order to test the hypotheses regarding firm size, IJV age, industry relatedness, and the main effects of intangible assets. Then, in step 2, the two dummy variables for shared ownership and majority ownership (O2 and O3) are added. These two dummy variables are entered in order to examine the main effects of the American firm's share of ownership. In the complete model presented in step 3, four interaction terms between the American firm's R&D intensity and the American firm's share of ownership are added to the regression. These terms are entered to test the hypotheses regarding the interaction effects between the American firm's intangible assets and the American firm's share of ownership. For the hypothesis regarding contribution to the American firm's value, we will present regression results of the complete model.

In Section 6.3 the ANOVA results indicate that significant differences exist among IJVs of different ages, which suggests that there might be a significant age effect. To test this, in Section 8.7, we will perform separate analyses over the four age groups.

Finally, as discussed in Section 7.1, the factor analysis results indicate that the IJV's return on capital and the IJV's growth in taxable income have very low communalities. This suggests that these two variables are unrelated to the four factors, which implies that these two variables might represent distinct dimensions. It is, therefore, of interest to examine that if there is an interaction effect between the American firm's intangible assets and the American firm's share of ownership on these two variables. To test this, in Section 8.8, we will conduct separate regression analyses

for these two variables. These regression analyses will be performed over the total sample as well as over the three industry groups.

8.1. Correlation Among Dependent and Independent Variables

Table 8.1 presents the correlation matrix and descriptive statistics of the dependent variables and the independent variables. According to Table 8.1, the correlation coefficient between ***IJV age*** and the IJV's ***growth in sales and productivity*** is negative and significant at the .001 level. This suggests that as the IJV ages, its ***growth in sales and productivity*** will slow down, which is consistent with Hypothesis H6a. Consistent with Hypothesis H6b, the correlation coefficient between ***IJV age*** and the IJV's ***revenue and profit*** is positive and significant at .001 level, which suggests that older IJVs tend to have more revenue and profit. The correlation coefficient between ***IJV age*** and the IJV's ***growth in profit*** is negative and significant at .01 level. This implies that as the IJV ages, its rate of growth in profit will decline, which is consistent with Hypothesis H6c. ***IJV age's*** correlation coefficients with the ***American firm's number of employees*** and the ***Japanese firm's number of employees*** are positive and significant. This indicates that the larger American firm and the larger Japanese firm have the tendency to start early in international cooperation. ***IJV age's*** correlation coefficients with the ***IJV's number of employees*** and the ***percentage of Japanese executives*** are positive and significant at .001 level, which implies that the older IJV hires more employees and proportionately tends to hire more Japanese executives. Further, it is also interesting to note that the ***IJV age's*** correlation coefficients with the ***American firm's R&D intensity*** and the ***Japanese firms' R&D intensity*** are negative and significant at .01 level.

Table 8.1: Correlation Matrix and Descriptive Statistics of Dependent and Independent Variables (N=191)

Variables	MEAN	STD	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Growth in Sales and Productivity	0.000	1.002	1.000												
2. Revenue and Profit	0.000	0.998	0.003	1.000											
3. Growth in Profit	0.000	1.021	-0.021	-0.007	1.000										
4. Productivity	0.000	0.999	-0.006	-0.002	0.013	1.000									
5. IJV Age	4.487	1.401	-0.357***	0.375***	-0.195**	0.080	1.000								
6. U.S. Firm's No. of Employees	1.353	0.713	-0.216**	0.258***	-0.006	0.124*	0.239***	1.000							
7. Japanese Firm's Sales	8.574	0.670	-0.086	0.176*	0.068	0.145*	0.184**	0.098	1.000						
8. IJV's No. of Employees	2.263	0.703	-0.018	0.509***	-0.084	0.076	0.509***	0.395***	0.227**	1.000					
9. American Firm's R&D Intensity	0.036	0.034	0.697***	0.005	0.043	0.206**	-0.195**	-0.187**	-0.017	0.034	1.000				
10. Japanese Firm's R&D Intensity	0.042	0.044	0.054	-0.139*	-0.040	-0.044	-0.186**	-0.083	-0.327***	-0.108	0.101	1.000			
11. Percentage of Japanese Executives	0.722	0.169	-0.139*	0.247***	0.052	0.188**	0.301***	0.214**	0.180*	0.459***	-0.034	-0.126*	1.000		
12. O2	0.500	0.119	0.095	0.004	-0.147*	-0.219**	-0.105	-0.154*	-0.158*	-0.129*	-0.023	-0.076	-0.159*	1.000	
13. O3	0.215	0.412	0.267***	-0.039	0.132*	0.331***	-0.107	0.002	0.116	-0.013	0.290***	-0.011	-0.027	-0.526***	1

* $p < 0.1$

** $p < 0.01$

*** $p < 0.001$

There are two possible interpretations for this phenomenon. First, it might be purely a historical coincidence that the parent firms of early IJVs have lower R&D intensity. However, another interesting explanation is that those American firms and Japanese firms with lower R&D intensity might deliberately choose the option of international cooperation in order to strengthen their competitive position.

It seems that the larger American firm tends to set up the larger IJV in Japan since the correlation between the ***American firm's number of employees*** and the ***IJV's number of employees*** is positive and significant at 0.001 level. However, the correlation matrix indicates no obvious relationship between the American firm's size and its Japanese partner's size. The correlation coefficient between the ***American firm's number of employees*** and the ***percentage of Japanese executives*** is positive and significant at .01 level, which means that the IJV with larger American parent proportionately tends to hire more Japanese executives. The ***American firm's number of employees*** is negatively related to the ***American firm's R&D intensity***, which implies that in our sample the larger American firm tend to have lower levels of R&D intensity. Finally, the correlation matrix also suggests that the larger American firm is less likely to choose shared ownership since the correlation coefficient between the ***American firm's number of employees*** and the dummy for shared ownership is negative and significant at .1 level.

The correlation between the ***dummy for majority ownership*** (O3) and the ***American firm's R&D intensity*** is positive and significant at the 0.001 level, which is consistent with the notion in the IJV literature that the foreign investing firm with high R&D intensity favors the use of majority ownership. It seems that the American firm with higher R&D intensity can facilitate its IJV to achieve the goals of higher rate of growth in sales and productivity and to operate at higher levels of productivity since the ***American firm's R&D intensity*** is positively and significantly correlated to the IJV's ***productivity*** and the IJV's ***growth in sales and productivity***.

The ***dummy for majority ownership*** (O3) is also found to be positively correlated with the IJV's ***growth in sales and productivity***, the IJV's ***growth in profit***, and the IJV's ***productivity***. This implies that the IJV in which the American firm has a majority position tends to be associated with a higher rate of growth in sales and productivity, a higher rate of growth in profit, and a higher level of productivity.

In contrast, the ***dummy for shared ownership*** (O2) is found to be negatively correlated with the IJV's ***growth in profit*** and the IJV's ***productivity***. This implies that the shared IJV tends to be associated with a lower rate of growth in profit, and a lower level of productivity. The correlation matrix also suggests that the ***dummy for shared ownership*** (O2) is negatively correlated to the ***Japanese firm's sales*** and the ***IJV's number of employees***, which means that shared ownership is less likely to be found in the larger IJV and in the IJV that has a larger Japanese parent firm. Further, it seems that the shared IJV proportionately tends to hire fewer Japanese executives since the correlation coefficient between the ***dummy for shared ownership*** (O2) and the ***percentage of Japanese executives*** is negative and significant at the .1 level.

The ***percentage of Japanese executives*** is found to be negatively correlated to the IJV's ***growth in sales and productivity***, and is found to be positively correlated to the IJV's ***revenue and profit***, and ***productivity***. It is also positively correlated with the ***Japanese firm's sales*** and the ***IJV's number of employees***, and is negatively correlated with the ***Japanese firm's R&D intensity***.

The American firm's size is positively associated with the IJV's performance as measured by the IJV's ***revenue and profit*** and ***productivity*** since these dependent variables' correlation coefficients with the ***American firm's number of employees*** are all positive and significant. However, the ***American firm's number of employees*** is found to be negatively correlated with the IJV's ***growth in sales and productivity***.

The Japanese firm's size is positively associated with the IJV's performance as measured by the IJV's ***revenue and profit*** and ***productivity*** since these dependent variables' correlation coefficients with the ***Japanese firm's sales*** are all positive and

significant. In addition, the correlation matrix also shows that the ***Japanese firm's sales*** is positively correlated to the ***IJV's number of employees***, and is negatively correlated to the ***Japanese firm's R&D intensity***.

8.2 Growth in Sales and Productivity

The hierarchical regression results for hypotheses regarding the IJV's growth in sales and productivity are presented in Table 8.2, Table 8.3, Table 8.4, and Table 8.5. Table 8.2 presents regression results based on the total sample. The hierarchical regression results from the chemical and allied products industry are presented in Table 8.3. The test results for the electrical and electronic equipment industry are presented in Table 8.4. Table 8.5 reports hypothesis test results for the machinery industry. Consistent with common practices, standardized regression coefficients are shown and their corresponding t-values are shown in parentheses.

According to Hypothesis H1a, the American firm's share of ownership and the American firm's intangible assets should have a positive interaction effect on the IJV's growth in sales and productivity. Specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the American firm's intangible assets on the IJV's growth in sales and productivity also increases. Consistent with this hypothesis, according to Table 8.1, the regression results based on the total sample indicate that the coefficient for the interaction term between the majority ownership dummy and the American firm's R&D intensity is positive and significant at the .05 level. The coefficient for the interaction term between shared ownership dummy and the American firm's R&D intensity is positive and non-significant. Therefore, our findings based on the total sample provide partial support for Hypothesis H1a.

Table 8.2 Results of Hierarchical Regression Analysis: Total Sample †

Dependent Variable: Growth in Sales and Productivity	Simple Regression	Step 1 (base model)	Step 2	Step 3 (complete model)
Intercepts	0	0	0	0
American Firm's R&D Intensity (RAD)	0.697 (13.36)****	0.653 (12.57)****	0.621 (11.54)****	0.333 (1.79)*
Japanese Firm's R&D Intensity (JRAD)	0.054 (0.57)	-0.078 (-1.45)	-0.052 (-0.96)	-0.001 (-0.01)
Dummy for Shared Ownership (O2)			0.156 (2.50)**	0.125 (1.16)
Dummy for Majority Ownership (O3)			0.141 (2.24)**	0.063 (0.55)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity				0.220 (1.25)
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity				0.406 (2.21)**
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity				-0.076 (-0.95)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity				-0.147 (-1.73)*
American Firm's Number of Employees (EMP)	-0.216 (-3.04)***	-0.018 (-0.34)	-0.009 (-0.16)	0.011 (0.19)
Japanese Firm's Sales (JSALE)	-0.086 (-1.19)	-0.050 (-0.91)	-0.044 (-0.81)	-0.074 (-1.33)
IJV Age (AGE)	-0.357 (-5.25)****	-0.216 (-3.95)****	-0.197 (-3.61)****	-0.197 (-3.65)****
The Percentage of Japanese Executives Hired by IJVs (JRAT)	-0.139 (-1.94)*	-0.058 (-1.07)	-0.037 (-0.68)	-0.045 (-0.84)
Industry Relatedness between US Firm & IJV (Rcode1)	0.126 (1.74)*	0.039 (0.74)	0.031 (0.59)	0.017 (0.32)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.015 (-0.21)	-0.078 (-1.25)	-0.078 (-1.26)	-0.056 (-0.89)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.001 (-0.02)	0.014 (0.22)	0.006 (0.10)	-0.001 (-0.01)
F		24.65****	21.44****	16.82****
Adj. R^2		0.5284	0.5420	0.5554
R^2		0.5507	0.5685	0.5905
ΔR^2			0.0178	0.0220
F-statistic for marginality test			3.6920	2.3504
p-value			0.0268	0.056

† N=191 Standardized regression coefficients are shown, t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Table 8.3 Results of Hierarchical Regression Analysis: Chemical †

Dependent Variable: Growth in Sales and Productivity	Simple Regression	Step 1 (base model)	Step 2	Step 3 (complete model)
Intercepts	0	0	0	0
American Firm's R&D Intensity (RAD)	0.660 (7.08)****	0.674 (6.02)****	0.636 (5.76)****	0.375 (0.95)
Japanese Firm's R&D Intensity (JRAD)	0.148 (1.20)	-0.032 (-0.29)	-0.034 (-0.31)	0.241 (0.88)
Dummy for Shared Ownership (O2)			0.275 (2.12)**	0.490 (1.20)
Dummy for Majority Ownership (O3)			0.269 (1.91)*	0.288 (0.74)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity				0.233 (0.55)
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity				0.452 (1.26)
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity				-0.409 (-1.15)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity				-0.417 (-1.17)
American Firm's Number of Employees (EMP)	0.061 (0.50)	0.025 (0.24)	0.025 (0.24)	0.007 (0.07)
Japanese Firm's Sales (JSALE)	-0.157 (-1.28)	0.037 (0.38)	0.033 (0.31)	-0.019 (-0.17)
IJV Age (AGE)	-0.071 (-0.57)	-0.031 (-0.28)	0.024 (0.22)	0.005 (0.04)
The Percentage of Japanese Executives Hired by IJVs (JRAT)	-0.110 (-0.90)	-0.161 (-1.49)	-0.146 (-1.39)	-0.139 (-1.33)
Industry Relatedness between US Firm & IJV (Rcode1)	0.249 (2.08)**	0.011 (0.09)	0.031 (0.59)	0.108 (0.83)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	0.165 (1.35)	-0.027 (-0.22)	-0.078 (-1.26)	-0.091 (-0.71)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	0.144 (1.17)	0.068 (0.60)	0.006 (0.10)	-0.053 (-0.47)
F		5.47****	5.17****	4.31****
Adj. R^2		0.3787	0.4099	0.4290
R^2		0.4634	0.5083	0.5588
ΔR^2			0.0449	0.0505
F-statistic for marginality test			2.5112	1.4594
p-value			0.0904	0.2283

† N=67 Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Table 8.4 Results of Hierarchical Regression Analysis: Electrical †

Dependent Variable: Growth in Sales and Productivity	Simple Regression	Step 1 (base model)	Step 2	Step3 (complete model)
Intercepts	0	0	0	0
American Firm's R&D Intensity (RAD)	0.675 (5.33)****	0.508 (3.33)***	0.466 (3.00)***	0.374 (0.38)
Japanese Firm's R&D Intensity (JRAD)	-0.076 (-0.44)	-0.056 (-0.36)	0.026 (0.016)	0.010 (0.04)
Dummy for Shared Ownership (O2)			0.310 (1.50)	0.253 (0.43)
Dummy for Majority Ownership (O3)			0.325 (1.64)*	0.296 (0.52)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity				0.043 (0.04)
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity				0.164 (0.15)
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity				0.057 (0.24)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity				-0.080 (-0.34)
American Firm's Number of Employees (EMP)	-0.507 (-3.43)***	-0.115 (-0.56)	-0.046 (-0.22)	-0.049 (-0.22)
Japanese Firm's Sales (JSALE)	0.230 (1.38)	0.092 (0.61)	0.091 (0.60)	0.062 (0.35)
IJV Age (AGE)	-0.474 (-3.14)***	-0.321 (-2.19)**	-0.267 (-1.81)*	-0.270 (-1.66)*
The Percentage of Japanese Executives Hired by IJVs (JRAT)	-0.274 (-1.66)*	-0.058 (-0.42)	-0.030 (-0.21)	-0.032 (-0.21)
Industry Relatedness between US Firm & IJV (Rcode1)	0.294 (1.79)*	-0.004 (-0.02)	-0.073 (-0.37)	-0.077 (-0.35)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.007 (-0.04)	0.263 (0.47)	0.191 (0.34)	0.261 (0.38)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.083 (-0.48)	-0.280 (-0.51)	-0.211 (-0.39)	-0.270 (-0.41)
F		4.60****	4.16***	2.60**
Adj. R^2		0.4807	0.4980	0.4066
R^2		0.6143	0.6558	0.6609
ΔR^2			0.0415	0.0091
F-statistic for marginality test			1.4468	0.1342
p-value			0.2551	0.9679

† N=36 Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Table 8.5 Results of Hierarchical Regression Analysis: Machinery †

Dependent Variable: Growth in Sales and Productivity	Simple Regression	Step 1 (base model)	Step 2	Step 3 (complete model)
Intercepts	0	0	0	0
American Firm's R&D Intensity (RAD)	0.791 (6.60)****	0.859 (5.81)****	0.752 (4.68)****	-0.096 (-0.11)
Japanese Firm's R&D Intensity (JRAD)	0.081 (0.42)	-0.073 (-0.42)	-0.129 (-0.72)	-0.517 (-0.14)
Dummy for Shared Ownership (O2)			0.233 (1.30)	-0.267 (-0.38)
Dummy for Majority Ownership (O3)			0.402 (1.86)*	-0.050 (-0.08)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity				0.803 (0.90)
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity				1.099 (1.13)
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity				0.431 (0.11)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity				-0.048 (-0.03)
American Firm's Number of Employees (EMP)	-0.110 (-0.57)	0.003 (0.02)	-0.026 (-0.15)	-0.008 (-0.04)
Japanese Firm's Sales (JSALE)	0.120 (0.61)	0.773 (0.29)	-0.037 (-0.21)	-0.107 (-0.52)
IJV Age (AGE)	-0.108 (-0.56)	-0.071 (-0.41)	-0.164 (-0.91)	-0.115 (-0.46)
The Percentage of Japanese Executives Hired by IJVs (JRAT)	-0.160 (-0.83)	-0.074 (-0.44)	-0.069 (-0.43)	-0.143 (-0.66)
Industry Relatedness between US Firm & IJV (Rcode1)	-0.072 (-0.37)	0.130 (0.80)	0.015 (0.08)	-0.005 (-0.02)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.167 (-0.86)	-0.005 (-0.04)	0.034 (0.20)	0.042 (0.24)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.098 (-0.50)	0.136 (0.82)	0.191 (1.18)	0.185 (1.03)
F		4.20***	4.13***	2.83**
Adj. R^2		0.5163	0.5603	0.5047
R^2		0.6776	0.7395	0.7798
ΔR^2			0.0619	0.0403
F-statistic for marginality test			1.9001	0.5490
p-value			0.1818	0.7035

† N=28 Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

However, such support disappears in separate regression analyses conducted over the three different industries. As shown in Table 8.3, Table 8.4 and Table 8.5, none of these regression analyses generates significant regression coefficients for the two interaction terms between ownership dummies and the American firm's R&D intensity.

Hypothesis H2a concerns the negative interaction effect between the Japanese firm's intangible assets and the American firm's share of ownership on the IJV's growth in sales and productivity. Stated specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the Japanese firm's intangible assets on the IJV's growth in sales and productivity will decrease. Consistent with this prediction, according to Table 8.2, the regression results based on the total sample indicate that the coefficient for the interaction term between majority ownership dummy and the Japanese firm's R&D intensity is negative and significant at .1 level. The coefficient for the interaction term between shared ownership dummy and the Japanese firm's R&D intensity is in the right direction. Nevertheless, it was not significant. Therefore, our findings based on the total sample only provide partial support for Hypothesis H2a.

As the case for Hypothesis H1a, the support for Hypothesis H2a also disappears in separate regression analyses conducted over the three different industries. According to Table 8.3, Table 8.4 and Table 8.5, none of these regression analyses generates significant regression coefficients for the two interaction terms between ownership dummies and the Japanese firm's R&D intensity.

Hypothesis H3a predicts that the American firm's number of employees is positively related to the IJV's growth in sales and productivity. However, in our complete model, the regression analysis based on the total sample (Table 8.2) and the regression analyses conducted over the three different industries (Table 8.3, Table 8.4, and Table 8.5) all generate insignificant regression coefficients for the American firm's number of employees. Therefore, Hypothesis H3a is not supported by our analysis.

Hypothesis H4a suggests that the Japanese firm's sales are positively related to the IJV's growth in sales and productivity. Nevertheless, for our complete model, the regression analysis based on the total sample (Table 8.2) and the regression analyses conducted over the three different industries (Table 8.3, Table 8.4, and Table 8.5) all generate insignificant regression coefficients for the Japanese firm's sales. Therefore, Hypothesis H4a is not supported by our analysis.

Hypothesis H6a states that as the IJV ages, its growth rate in sales and productivity will decline. Consistent with this hypothesis, in the complete model, the regression result based on the total sample (Table 8.2) and the regression results based on the electrical and electronic equipment industry (Table 8.5) indicate that the coefficient for IJV age is negative and significant. However, such support is absent from the regression analyses conducted over the chemical and allied product industry, (Table 8.3) and the machinery industry (Table 8.5). Therefore, Hypothesis H6a is only partially supported by our findings.

Hypothesis H7a suggests that as the IJV proportionally hire more local Japanese executives, there will be an increased rate of growth in its sales and productivity. Nevertheless, in the complete model, the coefficient for the percentage of Japanese executives is found to be negative and insignificant by our regression analyses conducted over the total sample and the three different industries. Hence, the percentage of Japanese executives seems not to have much influence upon the IJV's rate of growth in sales and productivity and Hypothesis H7a is rejected by our findings.

Finally, Hypothesis H8a predicts that the related IJV should enjoy a higher rate of growth in sales and productivity compared to the unrelated IJV. However, in our complete model, none of our regression analyses reports significant regression coefficient for the three industry relatedness dummies. Therefore, our analysis failed to find support for Hypothesis H8a.

Table 8.2 also presents the goodness of fit index for the models estimated over the total sample. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives, and the three dummies for industry relatedness are entered into the equation, the R square is 0.5507, which means that the model can explain 55.07 percent variance in the IJV's growth in sales and productivity. The F statistic for the model is 24.65 and it is significant at .001 level. After the two ownership dummies are added to the equation, the R square changes to 0.5685. The F statistic is 21.44 and is significant at .001 level. Compared to the base model in step 1, the partial F-statistic with 2 and 179 degrees of freedom is 3.6920. It is significant at the .05 level, which implies that adding the two ownership dummies significantly improves the model's explanatory power. When the four interaction terms are entered, the R square is further increased to 0.5905, which implies that the model can explain 59.05 percent of variance in the IJV's growth in sales and productivity. The corresponding F statistic is 16.82, which is significant at the .001 level. Compared to the model in step 2, the partial F-statistic with 4 and 175 degrees of freedom is 2.3504. It is significant at the .1 level, which implies that the four interaction terms further improve the model's explanatory power.

Table 8.3 presents the goodness of fit index for the models estimated over the chemical and allied product industry. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives, and the three dummies for industry relatedness are entered into the equation, the R square is 0.4634, which means that the model can explain 46.34 percent variance in the IJV's growth in sales and productivity. The F statistic for the model is 5.47 and it is significant at the .001 level. After the two ownership dummies are added to the equation, the R square changes to 0.5083. The F statistic is 5.17 and is significant at the .001 level. Compared to the base model in step 1, the partial F-

statistic with 2 and 55 degrees of freedom is 2.5112. It is significant at the .1 level, which implies that adding the two ownership dummies significantly improves the model's explanatory power. When the four interaction terms are entered, the R square is further increased to 0.5588, which implies that the model can explain 55.88 percent of variance in the IJV's growth in sales and productivity. The corresponding F statistic is 4.31, which is significant at the .001 level. Compared to the model in step 2, the partial F-statistic with 4 and 51 degrees of freedom is 1.4594. It is not significant, which implies that the four interaction terms do not add much explanatory power to the model.

Table 8.4 shows the goodness of fit index for the models estimated over the electrical and electronic equipment industry. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives, and the three dummies for industry relatedness are entered into the equation, the R square is 0.6143, which means that the model can explain 61.43 percent variance in the IJV's growth in sales and productivity. The F statistic for the model is 4.60 and it is significant at the .001 level. After the two ownership dummies are added to the equation, the R square changes to 0.6558. The F statistic is 4.16 and is significant at the .01 level. Compared to the base model in step 1, the partial F-statistic with 2 and 24 degrees of freedom is 1.4468. It is insignificant, which implies that adding the two ownership dummies does not significantly improves the model's explanatory power. When the four interaction terms are entered, the R square is further increased to 0.6609, which implies that the model can explain 66.09 percent of variance in the IJV's growth in sales and productivity. The corresponding F statistic is 2.60, which is significant at the .05 level. Compared to the model in step 2, the partial F-statistic with 4 and 20 degrees of freedom is 0.1342. It is not significant, which implies that the four interaction terms do not add much explanatory power to the model.

Table 8.5 shows the goodness of fit index for the models estimated over the machinery industry. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives, and the three dummies for industry relatedness are entered into the equation, the R square is 0.6776, which means that the model can explain 67.76 percent variance in the IJV's growth in sales and productivity. The F statistic for the model is 4.20 and it is significant at the .01 level. After the two ownership dummies are added to the equation, the R square changes to 0.7395. The F statistic is 4.13 and is significant at the .01 level. Compared to the base model in step 1, the partial F-statistic with 2 and 16 degrees of freedom is 1.9001. It is insignificant, which implies that adding the two ownership dummies does not significantly improves the model's explanatory power. When the four interaction terms are entered, the R square is further increased to 0.7798, which implies that the model can explain 73.98 percent of variance in the IJV's growth in sales and productivity. The corresponding F statistic is 2.83, which is significant at the .05 level. Compared to the model in step 2, the partial F-statistic with 4 and 12 degrees of freedom is 0.5490. It is not significant, which implies that the four interaction terms do not add much explanatory power to the model.

In summary, the regression analysis based on the total sample provides partial support for Hypothesis H1a and Hypothesis H2a. The marginality test shows that adding the four interaction terms to the model significantly improves the model's explanatory power. However, such support disappears after controlling for the industry effect. The marginality tests for models estimated over the three different industries indicate that adding the four interaction terms to the model does not add much explanatory power to the model.

Our analysis found partial support for Hypothesis H6a. While the test results based on the total sample and the electrical and electronic equipment industry provides

support for this hypothesis, such support is not evident in our analyses conducted over the chemical and allied product industry and the machinery industry. Our analyses provide no support for Hypothesis H3a, H4a, H7a, and H8a.

8.3 Revenue and Profit

The hierarchical regression results for hypotheses regarding the IJV's revenue and profit are presented in Table 8.6, Table 8.7, Table 8.8, and Table 8.9. Table 8.6 presents regression results based on the total sample. The hierarchical regression results from the chemical and allied products industry are presented in Table 8.7. The test results for the electrical and electronic equipment industry are presented in Table 8.8. Table 8.9 reports hypothesis test results for the machinery industry. In these tables, standardized regression coefficients are shown and their corresponding t-values are shown in parentheses.

Hypothesis H1b states that the American firm's share of ownership and the American firm's intangible assets have a positive interaction effect on the IJV's revenue and profit. Specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the American firm's intangible assets on the IJV's revenue and profit also increases. Despite this prediction, our regression results based on the total sample and the three different industries show. however, that the coefficients for the interaction terms between the two ownership dummies and the American firm's R&D intensity are insignificant. Therefore, our analysis found no support for Hypothesis H1b.

Table 8.6 Results of Hierarchical Regression Analysis: Total Sample †

Dependent Variable: Revenue and Profit	Simple Regression	Step 1 (base model)	Step 2	Step3 (complete Model)
ntercepts	0	0	0	0
American Firms' R&D Intensity (RAD)	0.005 (0.07)	0.039 (0.59)	0.047 (0.69)	-0.103 (-0.43)
Japanese Firms' R&D Intensity (JRAD)	-0.139 (-1.93)*	-0.071 (-1.06)	-0.052 (-0.77)	-0.108 (-1.24)
Dummy for Shared Ownership (O2)			0.123 (1.58)	0.028 (0.20)
Dummy for Majority Ownership (O3)			-0.006 (0.08)	-0.140 (-0.95)
Dummy for Shared Ownership (O2) X American Firms' R&D Intensity				0.115 (0.51)
Dummy for Majority Ownership (O3) X American Firms' R&D Intensity				0.163 (0.69)
Dummy for Shared Ownership (O2) X Japanese Firms' R&D Intensity				0.083 (0.81)
Dummy for Majority Ownership (O3) X Japanese Firms' R&D Intensity				0.085 (0.78)
American Firms' Number of Employees (EMP)	0.258 (3.67)****	0.116 (1.61)*	0.138 (1.91)*	0.150 (2.02)**
Japanese Firms' Sales (JSALE)	0.176 (2.46)**	0.014 (0.20)	0.031 (0.45)	0.029 (0.41)
IJV Age (AGE)	0.375 (5.56)****	0.146 (1.95)**	0.152 (2.02)**	0.153 (2.01)**
The Percentage of Japanese Executives Hired by IJVs (JRAT)	0.247 (3.50)****	-0.033 (-0.47)	-0.023 (-0.32)	-0.022 (-0.31)
IJV's Number of Employees (NOEMP)	0.509 (8.12)****	0.381 (4.53)****	0.376 (4.50)****	0.384 (4.49)****
Industry Relatedness between US Firm & IJV (Rcode1)	0.046 (0.63)	0.088 (1.31)	0.091 (1.37)	0.093 (1.37)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.133 (-1.85)*	-0.103 (-1.33)	-0.117 (-1.51)	-0.113 (-1.42)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.149 (-2.07)**	-0.083 (-1.07)	-0.006 (-0.08)	-0.105 (-1.34)
F		8.20****	7.21****	5.43****
Adj. R^2		0.2747	0.2817	0.2715
R^2		0.3129	0.3270	0.3329
ΔR^2 –			0.0141	0.0059
F-statistic for marginality test			1.875	0.3869
p-value			0.1564	0.8178

† N=191 Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Table 8.7 Results of Hierarchical Regression Analysis: Chemical †

Dependent Variable: Revenue and Profit	Simple Regression	Step 1 (base model)	Step 2	Step 3 (complete Model)
Intercepts	0	0	0	0
American Firms' R&D Intensity (RAD)	0.238 (1.98)*	0.315 (2.71)***	0.289 (2.52)**	0.255 (0.64)
Japanese Firms' R&D Intensity (JRAD)	-0.204 (-1.68)*	-0.057 (-0.52)	-0.068 (-0.63)	0.287 (1.05)
Dummy for Shared Ownership (O2)			0.212 (1.65)*	0.028 (0.20)
Dummy for Majority Ownership (O3)			0.273 (1.95)*	-0.140 (-0.95)
Dummy for Shared Ownership (O2) X American Firms' R&D Intensity				0.187 (0.23)
Dummy for Majority Ownership (O3) X American Firms' R&D Intensity				0.232 (0.25)
Dummy for Shared Ownership (O2) X Japanese Firms' R&D Intensity				0.087 (0.39)
Dummy for Majority Ownership (O3) X Japanese Firms' R&D Intensity				-0.217 (-0.97)
American Firms' Number of Employees (EMP)	0.239 (1.98)*	0.076 (0.75)*	0.063 (0.60)	0.062 (0.60)
Japanese Firms' Sales (JSALE)	0.225 (1.86)*	0.084 (0.74)	0.089 (0.80)	0.028 (0.24)
IJV Age (AGE)	0.326 (2.78)***	0.124 (1.12)	0.191 (1.66)*	0.163 (1.40)
The Percentage of Japanese Executives Hired by IJVs (JRAT)	0.388 (3.39)***	0.214 (1.93)*	0.235 (2.14)**	0.230 (2.11)**
IJV's Number of Employees (NOEMP)	0.537 (5.14)****	0.314 (2.54)**	0.288 (2.36)**	0.272 (2.19)**
Industry Relatedness between US Firm & IJV (Rcode1)	-0.164 (-1.34)	-0.303 (-2.49)**	-0.363 (-2.92)***	-0.442 (-3.40)***
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.196 (-1.61)*	-0.082 (-0.68)	-0.008 (-0.06)	0.056 (0.44)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.175 (-1.43)	-0.054 (-0.48)	-0.055 (-0.49)	-0.076 (-0.68)
F		5.40****	5.01****	4.27****
Adj. R^2		0.4002	0.4217	0.4422
R^2		0.4911	0.5268	0.5774
ΔR^2			0.0357	0.0506
F-statistic for marginality test			2.075	1.5266
p-value			0.1353	0.2084

† N=67 Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Table 8.8 Results of Hierarchical Regression Analysis: Electrical †

Dependent Variable: Revenue and Profit	Simple Regression	Step 1 (base model)	Step 2	Step 3 (complete model)
Intercepts	0	0	0	0
American Firms' R&D Intensity (RAD)	0.014 (0.08)	0.157 (0.94)	0.150 (0.98)	-0.117 (-0.13)
Japanese Firms' R&D Intensity (JRAD)	-0.122 (-0.72)	-0.018 (-0.11)	0.126 (0.84)	0.120 (0.56)
Dummy for Shared Ownership (O2)			0.582 (3.04)***	0.398 (0.75)
Dummy for Majority Ownership (O3)			0.415 (2.27)**	0.474 (0.92)
Dummy for Shared Ownership (O2) X American Firms' R&D Intensity				0.246 (0.28)
Dummy for Majority Ownership (O3) X American Firms' R&D Intensity				0.292 (0.29)
Dummy for Shared Ownership (O2) X Japanese Firms' R&D Intensity				0.089 (0.41)
Dummy for Majority Ownership (O3) X Japanese Firms' R&D Intensity				-0.215 (-0.97)
American Firms' Number of Employees (EMP)	0.371 (2.33)**	-0.018 (-0.07)*	0.156 (0.66)	0.103 (0.40)
Japanese Firms' Sales (JSALE)	0.121 (0.71)	-0.123 (-0.79)	-0.076 (-0.54)	-0.129 (-0.80)
IJV Age (AGE)	0.511 (3.46)***	0.097 (0.58)	0.210 (1.40)	0.183 (1.11)
The Percentage of Japanese Executives Hired by IJVs (JRAT)	0.409 (2.61)**	0.006 (0.04)	0.088 (0.62)	0.089 (0.54)
IJV's Number of Employees (NOEMP)	0.713 (5.93)****	0.663 (2.68)**	0.599 (2.72)**	0.662 (2.57)**
Industry Relatedness between US Firm & IJV (Rcode1)	-0.257 (-1.55)*	-0.250 (-1.24)	-0.339 (-1.87)*	-0.355 (-1.79)*
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.154 (-0.91)*	0.244 (0.41)	0.062 (0.12)	0.174 (0.27)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.182 (-1.08)	-0.386 (-0.64)	-0.238 (-0.45)	-0.314 (-0.51)
F		3.82***	4.87****	3.36***
Adj. R^2		0.4460	0.5701	0.5186
R^2		0.6043	0.7175	0.7386
ΔR^2			0.1132	0.0211
F-statistic for marginality test			4.809	0.4036
p-value			0.0175	0.8038

† N=36 Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Table 8.9 Results of Hierarchical Regression Analysis: Machinery †

Dependent Variable: Revenue and Profit	Simple Regression	Step 1 (base model)	Step 2	Step 3 (complete model)
Intercepts	0	0	0	0
American Firms' R&D Intensity (RAD)	-0.000 (-0.00)	-0.107 (-0.58)	0.111 (0.58)	0.330 (0.28)
Japanese Firms' R&D Intensity (JRAD)	-0.088 (-0.45)	0.102 (0.47)	0.074 (0.35)	-0.678 (-0.14)
Dummy for Shared Ownership (O2)			-0.052 (-0.24)	-0.031 (-0.03)
Dummy for Majority Ownership (O3)			-0.640 (-2.31)**	-0.426 (-0.50)
Dummy for Shared Ownership (O2) X American Firms' R&D Intensity				-0.176 (-0.15)
Dummy for Majority Ownership (O3) X American Firms' R&D Intensity				-0.373 (-0.30)
Dummy for Shared Ownership (O2) X Japanese Firms' R&D Intensity				0.774 (0.16)
Dummy for Majority Ownership (O3) X Japanese Firms' R&D Intensity				0.279 (0.13)
American Firms' Number of Employees (EMP)	0.227 (1.19)	-0.098 (-0.42)	-0.161 (-0.75)	-0.145 (-0.54)
Japanese Firms' Sales (JSALE)	0.071 (0.36)	0.271 (1.25)	0.473 (2.22)**	0.449 (1.64)*
IJV Age (AGE)	0.061 (0.31)	-0.439 (-1.76)*	-0.366 (-1.60)*	-0.415 (-1.27)
The Percentage of Japanese Executives Hired by IJVs (JRAT)	-0.078 (-0.40)	-0.343 (-1.64)*	-0.383 (-2.02)*	-0.323 (-1.13)
IJV's Number of Employees (NOEMP)	0.498 (2.93)***	1.172 (3.92)***	1.490 (4.92)****	1.487 (3.87)***
Industry Relatedness between US Firm & IJV (Rcode1)	-0.216 (-1.13)	0.119 (0.56)	0.441 (1.88)*	0.469 (1.51)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	0.036 (0.18)	-0.043 (-0.24)	-0.265 (-1.31)	-0.260 (-1.09)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	0.063 (0.32)	-0.145 (-0.68)	-0.330 (-1.58)*	-0.346 (-1.32)
F		1.96*	2.47**	1.39
Adj. R^2		0.2626	0.3944	0.1881
R^2		0.5357	0.6635	0.6692
ΔR^2			0.1278	0.0057
F-statistic for marginality test			3.0380	0.0517
p-value			0.0761	0.9943

† N=28 Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Hypothesis H2b concerns the negative interaction effect between the Japanese firm's intangible assets and the American firm's share of ownership on the IJV's revenue and profit. Stated specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the Japanese firm's intangible assets on the IJV's revenue and profit will decrease. However, our regression results based on the total sample and the three different industries have generated non-significant regression coefficients for the two interaction terms between the two ownership dummies and the Japanese firm's R&D intensity. Therefore, Hypothesis H2b is not supported by our findings.

Hypothesis H3b predicts that the American firm's number of employees is positively related to the IJV's revenue and profit. For the complete model, the regression results based on the total sample indicate that the coefficient for the American firm's number of employees is positive and significant at .05 level. However, the regression analyses based on the three different industries has generated insignificant regression coefficient for the American firm's number of employees. Therefore, our findings only provide partial support for Hypothesis H3b.

Hypothesis H4b suggests that the Japanese firm's sales is positively related to the IJV's revenue and profit. For the complete model, the regression results based on the machinery industry show that the coefficient for the Japanese firm's sales is positive and significant at .1 level. However, the regression analyses based on the total sample and the other two industries found this coefficient to be insignificant. Therefore, Hypothesis H4b received partial support from our findings.

Hypothesis H5a suggests that the IJV's number of employees is positively related to the IJV's revenue and profit. For the complete sample, our regression results based on the total sample and the three different industries all indicate that the coefficient of the IJV's number of employees is positive and significant. Therefore, Hypothesis H5a is strongly supported by our findings.

Hypothesis H6b states that older IJVs tend to have a larger revenue and profit. For the complete model, the regression results based on the total sample show that the coefficient for IJV age is positive and significant at .05 level. However, the regression analyses based on the three industries found this coefficient to be insignificant. Therefore, Hypothesis H6b is partially supported by our findings.

Hypothesis H7b suggests that as IJVs proportionally hire more Japanese executives, there will be an increased revenue and profit. For the complete model, the regression results based on the chemical and allied product industry show that the coefficient for the percentage of local Japanese executives is positive and significant at .05 level. However, the regression analyses based on the total sample and the other two industries found this coefficient to be insignificant. Therefore, our support for Hypothesis H7b is partial.

Finally, Hypothesis H8b predicts that the related IJV should have a larger revenue and profit than the unrelated IJV. Contrary to this prediction, for the complete model, the regression results based on the chemical and allied product industry as well as the electrical and electronic equipment industry report a negative and significant regression coefficient for rcode1, which denotes industry relatedness between the IJV and its American parent firm. The regression results based on the total sample and the machinery industry found this coefficient to be insignificant. For the other two industry relatedness dummies, none of our regression analysis reports a significant regression coefficient. Therefore, Hypothesis H8b is rejected by our findings.

Table 8.6 presents the goodness of fit index for the models estimated over the total sample. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives, the IJV's number of employees, and the three dummies for industry relatedness are entered into the equation, the R square is 0.3129, which means that the model can explain 31.29

percent variance in the IJV's revenue and profit. The F statistic for the model is 8.20 and it is significant at .001 level. After the two ownership dummies are added to the equation, the R square changes to 0.3270. The F statistic is 7.21 and is significant at .001 level. Compared to the base model in step 1, the partial F-statistic with 2 and 178 degrees of freedom is 1.875. It is insignificant, which implies that adding the two ownership dummies does not significantly improve the model's explanatory power. When the four interaction terms are entered, the R square is further increased to 0.3329, which implies that the model can explain 33.29 percent of variance in the IJV's revenue and profit. The corresponding F statistic is 5.43, which is significant at .001 level. Compared to the model in step 2, the partial F-statistic with 4 and 174 degrees of freedom is 0.3869. It is not significant, which implies that the four interaction terms do not add much explanatory power to the model.

Table 8.7 presents the goodness of fit index for the models estimated over the chemical and allied product industry. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives, the IJV's number of employees, and the three dummies for industry relatedness are entered into the equation, the R square is 0.4911, which means that the model can explain 49.11 percent variance in the IJV's revenue and profit. The F statistic for the model is 5.40 and it is significant at .001 level. After the two ownership dummies are added to the equation, the R square changes to 0.5268. The F statistic is 5.01 and is significant at .001 level. Compared to the base model in step 1, the partial F-statistic with 2 and 54 degrees of freedom is 2.075. It is marginally significant at .1 level, which implies that adding the two ownership dummies marginally improves the model's explanatory power. When the four interaction terms are entered, the R square is further increased to 0.5774, which implies that the model can explain 57.44 percent of variance in the IJV's revenue and profit. The corresponding F statistic is 4.27, which is significant at .001 level. Compared to the

model in step 2, the partial F-statistic with 4 and 50 degrees of freedom is 1.5266. It is not significant, which implies that the four interaction terms do not add much explanatory power to the model.

Table 8.8 shows the goodness of fit index for the models estimated over the electrical and electronic equipment industry. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives hired by the IJV, the IJV's number of employees, and the three dummies for industry relatedness are entered into the equation, the R square is 0.6043, which means that the model can explain 60.43 percent variance in the IJV's revenue and profit. The F statistic for the model is 3.82 and it is significant at .01 level. After the two ownership dummies are added to the equation, the R square changes to 0.7175. The F statistic is 4.87 and is significant at .001 level. Compared to the base model in step 1, the partial F-statistic with 2 and 23 degrees of freedom is 4.809. It is significant at .05 level, which implies that adding the two ownership dummies significantly improves the model's explanatory power. When the four interaction terms are entered, the R square is further increased to 0.7386, which implies that the model can explain 73.86 percent of variance in the IJV's revenue and profit. The corresponding F statistic is 3.36, which is significant at .01 level. Compared to the model in step 2, the partial F-statistic with 4 and 19 degrees of freedom is 0.4036. It is not significant, which implies that the four interaction terms do not add much explanatory power to the model.

Table 8.9 shows the goodness of fit index for the models estimated over the machinery industry. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives, the IJV's number of employees, and the three dummies for industry relatedness are entered into the equation, the R square is 0.5357, which means that the model can explain 53.57

percent variance in the IJV's revenue and profit. The F statistic for the model is 1.96 and it is significant at .1 level. After the two ownership dummies are added to the equation, the R square changes to 0.6635. The F statistic is 2.47 and is significant at .05 level. Compared to the base model in step 1, the partial F-statistic with 2 and 15 degrees of freedom is 3.0380. It is significant at .1 level, which implies that adding the two ownership dummies significantly improves the model's explanatory power. When the four interaction terms are entered, the R square is further increased to 0.6692, which implies that the model can explain 66.92 percent of variance in the IJV's revenue and profit. The corresponding F statistic is 1.39, which is insignificant at .1 level. Compared to the model in step 2, the partial F-statistic with 4 and 11 degrees of freedom is 0.0517. It is not significant, which implies that the four interaction terms do not add much explanatory power to the model.

In summary, our regression analysis based on the total sample and the three different industries provide no support for Hypothesis H1b and Hypothesis H2b. This is consistent with the marginality test result. The F-statistics and their corresponding p-values show that adding the four interaction terms to the models does not significantly improves the models' explanatory power. Our analysis found strong support for Hypothesis H5a. The support for Hypothesis H3b, H4b, H6b, and H7b is mixed. Our findings rejected Hypothesis H8b.

8.4 Growth in Profit

The hierarchical regression results for hypotheses regarding the IJV's growth rate in profit are presented in Table 8.10, Table 8.11, Table 8.12, and Table 8.13. Table 8.10 presents regression results based on the total sample. The hierarchical regression results from the chemical and allied products industry are presented in Table 8.11. The test results for the electrical and electronic equipment industry are

Table 8.10 Results of Hierarchical Regression Analysis: Total Sample †

Dependent Variable: Growth in Profit	Simple Regression	Step 1 (base model)	Step 2	Step 3 (complete model)
Intercepts	0	0	0	0
American Firm's R&D Intensity (RAD)	0.043 (0.59)	0.005 (0.06)	-0.008 (-0.10)	-0.416 (-1.52)
Japanese Firm's R&D Intensity (JRAD)	-0.040 (-0.54)	-0.064 (-0.82)	-0.083 (-1.06)	-0.100 (-1.00)
Dummy for Shared Ownership (O2)			-0.134 (-1.49)	-0.280 (-1.76)*
Dummy for Majority Ownership (O3)			0.020 (0.22)	-0.173 (-1.02)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity				0.376 (1.45)
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity				0.427 (1.58)*
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity				-0.004 (-0.04)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity				0.038 (0.30)
American Firm's Number of Employees (EMP)	-0.006 (-0.08)	0.047 (0.60)	0.022 (0.28)	0.045 (0.55)
Japanese Firm's Sales (JSALE)	0.068 (0.94)	0.049 (0.62)	0.029 (0.36)	0.017 (0.21)
IJV Age (AGE)	-0.195 (-2.74)***	-0.257 (-3.27)****	-0.260 (-3.30)****	-0.254 (-3.20)***
The Percentage of Japanese Executives Hired by IJVs (JRAT)	0.052 (0.72)	0.087 (1.12)	0.078 (0.99)	0.082 (1.04)
Industry Relatedness between US Firm & IJV (Rcode1)	0.025 (0.35)	0.032 (0.42)	0.028 (0.36)	0.023 (0.30)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.027 (-0.37)	0.045 (0.50)	0.062 (0.69)	0.078 (0.85)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.126 (-1.75)*	-0.153 (-1.71)*	-0.134 (-1.50)	-0.144 (-1.60)*
F		1.73*	1.77*	1.47
Adj. R^2		0.0334	0.0425	0.0355
R^2		0.0792	0.0979	0.1117
ΔR^2			0.0187	0.0138
F-statistic for marginality test			1.8553	0.6797
p-value			0.1594	0.6769

† N=191 Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Table 8.11 Results of Hierarchical Regression Analysis: Chemical †

Dependent Variable: Growth in Profit	Simple Regression	Step 1 (base model)	Step 2	Step 3 (complete model)
Intercepts	0	0	0	0
American Firm's R&D Intensity (RAD)	0.089 (0.72)	0.064 (0.50)	0.047 (0.36)	0.097 (0.20)
Japanese Firm's R&D Intensity (JRAD)	-0.005 (-0.04)	-0.021 (-0.16)	-0.044 (-0.34)	-0.028 (-0.08)
Dummy for Shared Ownership (O2)			0.040 (0.26)	0.009 (0.02)
Dummy for Majority Ownership (O3)			0.204 (1.22)	0.313 (0.65)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity				-0.108 (-0.21)
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity				-0.000 (-0.00)
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity				0.120 (0.27)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity				-0.151 (-0.34)
American Firm's Number of Employees (EMP)	0.237 (1.96)*	0.188 (1.59)*	0.146 (1.18)	0.156 (1.20)
Japanese Firm's Sales (JSALE)	0.104 (0.84)	0.065 (0.51)	0.068 (0.53)	0.063 (0.45)
IJV Age (AGE)	-0.385 (-3.36)****	-0.458 (-3.68)****	-0.407 (-3.13)***	-0.429 (-3.13)***
The Percentage of Japanese Executives Hired by IJVs (JRAT)	-0.033 (-0.27)	0.038 (0.31)	0.046 (0.37)	0.037 (0.28)
Industry Relatedness between US Firm & IJV (Rcode1)	0.118 (0.96)	0.196 (1.37)	0.140 (0.94)	0.101 (0.62)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	0.015 (0.12)	-0.030 (-0.21)	0.027 (0.18)	0.067 (0.41)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.117 (-0.95)	-0.225 (-1.70)*	-0.200 (-1.48)	-0.215 (-1.51)
F		2.47**	2.20**	1.56
Adj. R^2		0.1672	0.1665	0.1138
R^2		0.2808	0.3054	0.3152
ΔR^2			0.0246	0.0098
F-statistic for marginality test			0.9739	0.1825
p-value			0.3840	0.9465

† N=67 Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Table 8.12 Results of Hierarchical Regression Analysis: Electrical †

Dependent Variable: Growth in Profit	Simple Regression	Step 1 (base model)	Step 2	Step 3 (complete model)
Intercepts	0	0	0	0
American Firm's R&D Intensity (RAD)	0.164 (0.97)	0.004 (0.02)	-0.033 (-0.14)	-2.397 (-1.77)*
Japanese Firm's R&D Intensity (JRAD)	0.032 (0.19)	0.176 (0.81)	0.146 (0.62)	-0.104 (-0.32)
Dummy for Shared Ownership (O2)			-0.138 (-0.45)	-1.380 (-1.71)*
Dummy for Majority Ownership (O3)			0.044 (0.15)	-1.123 (-1.43)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity				2.293 (1.72)*
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity				2.661 (1.76)*
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity				0.215 (0.64)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity				0.090 (0.28)
American Firm's Number of Employees (EMP)	-0.300 (-1.84)*	-0.466 (-1.63)*	-0.501 (-1.66)*	-0.523 (-1.69)*
Japanese Firm's Sales (JSALE)	0.014 (0.08)	0.118 (0.56)	0.074 (0.33)	0.044 (0.18)
IJV Age (AGE)	-0.181 (-1.08)	-0.037 (-0.18)	-0.056 (-0.26)	-0.039 (-0.17)
The Percentage of Japanese Executives Hired by IJVs (JRAT)	0.160 (0.94)	0.378 (1.93)*	0.355 (1.73)*	0.418 (1.94)*
Industry Relatedness between US Firm & IJV (Rcode1)	0.233 (1.40)	0.166 (0.60)	0.158 (0.55)	0.231 (0.76)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.018 (-0.10)	-0.426 (-0.54)	-0.308 (-0.38)	0.433 (0.46)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.050 (-0.29)	0.529 (0.69)	0.430 (0.15)	-0.226 (-0.25)
F		0.89	0.75	0.75
Adj. R^2		-0.0299	-0.0836	-0.1205
R^2		0.2350	0.2570	0.3597
ΔR^2			0.0220	0.1027
F-statistic for marginality test			0.4106	0.8020
p-value			0.6678	0.5382

† N=36 Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Table 8.13 Results of Hierarchical Regression Analysis: Machinery †

Dependent Variable: Growth in Profit	Simple Regression	Step 1 (base model)	Step 2	Step 3 (complete model)
Intercepts	0	0	0	0
American Firm's R&D Intensity (RAD)	0.211 (1.10)	0.185 (0.87)	0.045 (-0.14)	-1.010 (-0.78)
Japanese Firm's R&D Intensity (JRAD)	-0.107 (-0.55)	-0.523 (-2.09)**	-0.353 (-1.37)	-3.769 (-0.72)
Dummy for Shared Ownership (O2)			-0.381 (-1.48)	-1.234 (-1.24)
Dummy for Majority Ownership (O3)			0.156 (0.50)	-0.791 (-0.85)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity				0.913 (0.72)
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity				1.529 (1.10)
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity				3.604 (0.66)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity				1.264 (0.55)
American Firm's Number of Employees (EMP)	-0.179 (-0.92)*	-0.406 (-1.59)*	-0.383 (-1.57)*	-0.338 (-1.25)
Japanese Firm's Sales (JSALE)	-0.042 (-0.21)	-0.459 (-1.86)*	-0.531 (-2.14)**	-0.625 (-2.15)**
IJV Age (AGE)	-0.197 (-1.02)	-0.104 (-0.41)	-0.224 (-0.87)	-0.267 (-0.75)
The Percentage of Japanese Executives Hired by IJVs (JRAT)	-0.116 (-0.59)	0.039 (0.16)	0.039 (0.17)*	0.009 (0.03)
Industry Relatedness between US Firm & IJV (Rcode1)	-0.160 (-0.83)	-0.292 (-1.26)	-0.434 (-1.73)*	-0.502 (-1.63)*
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.124 (-0.64)	-0.005 (-0.02)	0.215 (0.91)	0.238 (0.95)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.236 (-1.24)	-0.375 (-1.58)*	-0.311 (-1.34)	-0.276 (-1.08)
F		1.02	1.24	0.98
Adj. R^2		0.0076	0.0905	-0.0094
R^2		0.3384	0.4610	0.5514
ΔR^2			0.1226	0.0904
F-statistic for marginality test			1.8197	0.6046
p-value			0.1941	0.6668

† N=28 Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

presented in Table 8.12. Table 8.13 reports hypothesis test results for the machinery industry. In these tables, standardized regression coefficients are shown and their corresponding t-values are shown in parentheses.

Hypothesis H1c suggests that the American firm's share of ownership and the American firm's intangible assets should have a positive interaction effect on the IJV's growth in profit. Specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the American firm's intangible assets on the IJV's growth in profit also increases. Consistent with this hypothesis, according to Table 8.10, the regression results based on the total sample indicate that the coefficient for the interaction term between majority ownership dummy and the American firm's R&D intensity is positive and is significant at .1 level. The coefficient for the interaction term between shared ownership dummy and the American firm's R&D intensity is positive and insignificant. The regression results based on the electrical and electronics equipment industry indicate that both coefficients for the two interaction terms between ownership dummies and the American firm's R&D intensity are positive and significant at .1 level. However, Such support is not evident according to our regression analyses conducted over the chemical and allied product industry as well as the machinery industry. Therefore, our analyses provide partial support for Hypothesis H1c.

Hypothesis H2c concerns the negative interaction effect between the Japanese firm's intangible assets and the American firm's share of ownership on the IJV's growth in profit. Stated specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the Japanese firm's intangible assets on the IJV's growth in profit will decline. However, the regression results based on the total sample and the three different industries all indicate insignificant regression coefficients for the two interaction terms between ownership dummies and the Japanese firm's R&D intensity. Therefore, our findings provide no support for Hypothesis H2c.

Hypothesis H3c predicts that the American firm's number of employees is positively related to the IJV's growth in profit. For the complete model, the regression results based on the total sample as well as the chemical and allied products industry indicate that the regression coefficient for the American firm's number of employees is positive and insignificant. The regression results based on the electrical and electronic equipment industry indicate that this coefficient is negative and marginally significant at .1 level. Our regression results based on the machinery industry show that this coefficient is negative and insignificant. Therefore, Hypothesis H3c is rejected by our findings.

Hypothesis H4c suggests that the Japanese firm's sales is positively related to the IJV's growth in sales and productivity. For the complete model, the regression analyses based on the total sample and the regression analyses conducted over the chemical and allied product industry as well as the electrical and electronics equipment industry show that the regression coefficient for the Japanese firm's sales is positive and insignificant. The regression analysis based on the machinery industry indicates, however, that this coefficient is negative and significant at .05 level. Therefore, our findings rejected Hypothesis H4c.

Hypothesis H6c states that as the IJV ages, its growth rate in profit will decline. Consistent with this hypothesis, for the complete model, the regression results based on the total sample and the chemical and allied product industry indicate that the regression coefficient for IJV age is negative and significant at .01 level. The regression results based on the electrical and electronic equipment industry as well as the machinery industry show, however, that this coefficient is negative and insignificant. Therefore, our findings provide partial support for Hypothesis H6c.

Hypothesis H7c suggests that as the IJV proportionally hires more local Japanese executives, there will be an increased rate of growth in its profit. Such notion is supported by the regression results based on the electrical and electronic equipment industry. Our egression analyses based on the total sample and the other two industries show, however, that in the complete model the regression coefficient for the

percentage of local Japanese executives is positive and insignificant. Therefore, our analyses provide partial support for Hypothesis H7c

Finally, Hypothesis H8c predicts that the related IJV should enjoy a higher rate of growth in profit compared to the unrelated IJV. Contrary to this hypothesis, for the complete model, the regression results based on the total sample and the chemical and allied products industry indicate a negative and significant regression coefficient for Rcode3 which denotes the industry relatedness between the IJV and its local Japanese parent firm. The regression results based on the machinery industry indicate a negative and marginally significant regression coefficient for Rcode1, which denotes the industry relatedness between the IJV and its American parent firm. Therefore, the regression results reject the prediction made by Hypothesis H8a.

Table 8.10 also presents the goodness of fit index for the models estimated over the total sample. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives, and the three dummies for industry relatedness are entered into the equation, the R square is 0.0792, which means that the model can explain 7.92 percent variance in the IJV's growth in profit. The F statistic for the model is 1.73 and it is significant at .1 level. After the two ownership dummies are added to the equation, the R square changes to 0.0979. The F statistic is 1.77 and is significant at .1 level. Compared to the base model in step 1, the partial F-statistic with 2 and 179 degrees of freedom is 1.8553. It is not significant, which implies that adding the two ownership dummies does not significantly improve the model's explanatory power. When the four interaction terms are entered, the R square is further increased to 0.1117, which implies that the model can explain 11.17 percent of variance in the IJV's growth in profit. The corresponding F statistic is 1.47, which is not significant. Compared to the model in step 2, the partial F-statistic with 4 and 175 degrees of freedom is 0.6797. It is not significant, which

implies that the four interaction terms do not add much explanatory power to the model.

Table 8.11 presents the goodness of fit index for the models estimated over the chemical and allied product industry. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives, and the three dummies for industry relatedness are entered into the equation, the R square is 0.2808, which means that the model can explain 28.08 percent variance in the IJV's growth in profit. The F statistic for the model is 2.47 and it is significant at .05 level. After the two ownership dummies are added to the equation, the R square changes to 0.3054. The F statistic is 2.20 and is significant at .05 level. Compared to the base model in step 1, the partial F-statistic with 2 and 55 degrees of freedom is 0.9739. It is not significant, which implies that adding the two ownership dummies does not significantly improve the model's explanatory power. When the four interaction terms are entered, the R square is increased to 0.3152, which implies that the model can explain 31.52 percent of variance in the IJV's growth in profit. The corresponding F statistic is 1.56, which is not significant. Compared to the model in step 2, the partial F-statistic with 4 and 51 degrees of freedom is 0.1825. It is not significant, which implies that the four interaction terms do not add much explanatory power to the model.

Table 8.12 shows the goodness of fit index for the models estimated over the electrical and electronic equipment industry. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives, and the three dummies for industry relatedness are entered into the equation, the R square is 0.2350. After the two ownership dummies are added to the equation, the R square changes to 0.2570. When the four interaction terms are entered, the R square is increased to 0.3597. However, the adjusted R squares for these models are negative, which implies that these models can hardly explain any variance

in the IJV's growth in profit. The high R-values are merely a product of this index's sensitivity to the magnitudes of the number of observations (36) and the number of independent variables (9, 11, 15) in small samples (Jobson, 199a:227). This is consistent with these models' F-statistics. None of them is significant.

Table 8.13 shows the goodness of fit index for the models estimated over the machinery industry. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives hired by the IJV, and the three dummies for industry relatedness are entered into the equation, the R square is 0.3384. After the two ownership dummies are added to the equation, the R square changes to 0.4610. When the four interaction terms are entered, the R square is increased to 0.5514. However, the adjusted R squares for these models are either very small or negative, which implies that these models can hardly explain any variance in the IJV's growth in profit. As is the case with the models estimated over the electrical and electronic equipment industry, the high R square values are merely a product of this index's sensitivity to the magnitudes of the number of observations (28) and the number of independent variables (9, 11, 15) in small samples. This is consistent with these models' insignificant F-statistics.

In summary, our regression analyses provide partial support for Hypothesis H1c, H6c and H7c. Our findings provide no support for Hypothesis H2c, H3c, H4c and H8c.

8.5 Productivity

The hierarchical regression results for hypotheses regarding the IJV's productivity are presented in Table 8.14, Table 8.15, Table 8.16, and Table 8.17. Table 8.14 presents regression results based on the total sample. The hierarchical regression results from the chemical and allied products industry are presented in Table 8.15. The

test results for the electrical and electronic equipment industry are presented in Table 8.16. Table 8.17 reports hypothesis test results for the machinery industry. In these tables, standardized regression coefficients are shown and their corresponding t-values are shown in parentheses.

Hypothesis H1d states that the American firm's share of ownership and the American firm's intangible assets have a positive interaction effect on the IJV's productivity. Specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the American firm's intangible assets on the IJV's productivity also increases. Our regression results based on the total sample show that in the complete model the coefficient of the interaction term between majority ownership and the American firm's R&D intensity is significant at .1 level. Our regression analyses conducted over the three different industries indicate that the regression coefficients of the two interaction terms between ownership dummies and the American firm's R&D intensity are insignificant. Therefore, the support for Hypothesis H1d is mixed.

Hypothesis H2d concerns the negative interaction effect between the Japanese firm's intangible assets and the American firm's share of ownership on the IJV's productivity. Stated specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the Japanese firm's intangible assets on the IJV's productivity will decline. However, our regression results based on the total sample and the three different industries have generated insignificant regression coefficients for the two interaction terms between the ownership dummies and the Japanese firm's R&D intensity. Therefore, Hypothesis H2d is not supported by our findings.

Table 8.14 Results of Hierarchical Regression Analysis: Total Sample †

Dependent Variable: Productivity	Simple Regression	Step 1 (base model)	Step 2	Step 3 (complete model)
Intercepts	0	0	0	0
American Firms' R&D Intensity (RAD)	0.206 (2.89)***	0.256 (3.47)****	0.173 (2.32)**	0.062 (0.24)
Japanese Firms' R&D Intensity (JRAD)	-0.044 (-0.60)	-0.006 (-0.08)	-0.004 (-0.05)	-0.022 (-0.24)
Dummy for Shared Ownership (O2)			-0.027 (-0.32)	0.010 (0.07)
Dummy for Majority Ownership (O3)			0.275 (3.22)***	0.008 (0.05)
Dummy for Shared Ownership (O2) X American Firms' R&D Intensity				-0.087 (-0.37)
Dummy for Majority Ownership (O3) X American Firms' R&D Intensity				0.404 (1.63)*
Dummy for Shared Ownership (O2) X Japanese Firms' R&D Intensity				0.054 (0.50)
Dummy for Majority Ownership (O3) X Japanese Firms' R&D Intensity				0.005 (0.04)
American Firms' Number of Employees (EMP)	0.124 (1.72)*	0.188 (2.34)**	0.147 (1.88)*	0.175 (2.26)**
Japanese Firms' Sales (JSALE)	0.145 (2.02)**	0.131 (1.70)*	0.097 (1.29)	0.072 (0.96)
IJV Age (AGE)	0.080 (1.11)	0.103 (1.22)	0.122 (1.50)	0.127 (1.59)*
The Percentage of Japanese Executives Hired by IJVs (JRAT)	0.188 (2.63)***	0.179 (2.25)**	0.190 (2.46)**	0.171 (2.26)**
IJV's Number of Employees (NOEMP)	0.076 (1.04)	-0.179 (-1.90)*	-0.163 (-1.80)*	-0.168 (-1.88)*
Industry Relatedness between US Firm & IJV (Rcode1)	0.121 (1.68)*	0.132 (1.76)*	0.108 (1.50)	0.089 (1.26)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	0.024 (0.33)	0.003 (0.03)	0.039 (0.46)	0.059 (0.71)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.012 (-0.16)	0.002 (0.03)	0.030 (0.36)	0.014 (0.18)
F		2.92***	3.98****	4.02****
Adj. R^2		0.0917	0.1585	0.2026
R^2		0.1395	0.2116	0.2698
ΔR^2			0.0721	0.0582
F-statistic for marginality test			8.139	3.4676
p-value			0.0004	0.0094

† N=191 Standardized regression coefficients are shown. t-values are presented in parentheses.
* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Table 8.15 Results of Hierarchical Regression Analysis: Chemical †

Dependent Variable: Productivity	Simple Regression	Step 1 (base model)	Step 2	Step 3 (complete model)
Intercepts	0	0	0	0
American Firms' R&D Intensity (RAD)	0.174 (1.42)	0.002 (0.01)	-0.008 (-0.06)	0.012 (0.03)
Japanese Firms' R&D Intensity (JRAD)	-0.018 (-0.14)	0.025 (0.18)	-0.058 (-0.49)	-0.310 (-1.02)
Dummy for Shared Ownership (O2)			-0.110 (-0.78)	-0.317 (-0.69)
Dummy for Majority Ownership (O3)			0.485 (3.16)***	0.083 (0.19)
Dummy for Shared Ownership (O2) X American Firms' R&D Intensity				-0.220 (-0.47)
Dummy for Majority Ownership (O3) X American Firms' R&D Intensity				0.207 (0.52)
Dummy for Shared Ownership (O2) X Japanese Firms' R&D Intensity				0.450 (1.14)
Dummy for Majority Ownership (O3) X Japanese Firms' R&D Intensity				0.323 (0.83)
American Firms' Number of Employees (EMP)	0.200 (1.65)*	0.220 (1.71)*	0.077 (0.68)	0.101 (0.88)
Japanese Firms' Sales (JSALE)	-0.021 (-0.17)	-0.098 (-0.69)	-0.070 (-0.58)	-0.031 (-0.24)
IJV Age (AGE)	0.054 (0.43)	-0.004 (-0.03)	0.142 (1.13)	0.122 (0.95)
The Percentage of Japanese Executives Hired by IJVs (JRAT)	0.160 (1.30)	0.096 (0.69)	0.125 (1.04)	0.124 (1.03)
IJV's Number of Employees (NOEMP)	0.152 (1.24)	0.040 (0.26)	-0.017 (-0.13)	-0.029 (-0.21)
Industry Relatedness between US Firm & IJV (Rcode1)	0.318 (2.71)***	0.402 (2.62)***	0.247 (1.81)*	0.262 (1.82)*
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	0.064 (0.52)	-0.132 (-0.86)	0.012 (0.09)	0.041 (0.29)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.017 (-0.14)	-0.079 (-0.56)	0.026 (0.21)	-0.014 (-0.14)
F		1.30	3.42****	2.89***
Adj. R^2		0.0428	0.3057	0.3144
R^2		0.1879	0.4320	0.4806
ΔR^2			0.2441	0.0486
F-statistic for marginality test			11.6033	1.1696
p-value			0.0000	0.3355

† N=67 Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Table 8.16 Results of Hierarchical Regression Analysis: Electrical †

Dependent Variable: Productivity	Simple Regression	Step 1 (base model)	Step 2	Step 3 (complete model)
Intercepts	0	0	0	0
American Firm's R&D Intensity (RAD)	0.417 (2.68)**	0.563 (2.54)**	0.394 (2.05)**	-0.278 (-0.30)
Japanese Firm's R&D Intensity (JRAD)	-0.063 (-0.37)	0.040 (0.19)	-0.030 (-0.16)	0.007 (0.03)
Dummy for Shared Ownership (O2)			-0.389 (-1.62)*	-0.257 (-0.46)
Dummy for Majority Ownership (O3)			0.238 (1.04)	-0.425 (-0.78)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity				0.271 (0.29)
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity				1.211 (1.17)
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity				-0.180 (-0.78)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity				0.025 (0.11)
American Firm's Number of Employees (EMP)	-0.039 (-0.23)	0.286 (0.83)	0.093 (0.31)	0.023 (0.08)
Japanese Firm's Sales (JSALE)	0.265 (1.60)*	0.199 (0.97)	0.042 (0.24)	0.024 (0.14)
IJV Age (AGE)	0.110 (0.65)	0.278 (1.27)	0.187 (0.99)	0.191 (1.11)
The Percentage of Japanese Executives Hired by IJVs (JRAT)	0.052 (0.30)	0.190 (0.91)	0.077 (0.43)	-0.046 (-0.27)
IJV's Number of Employees (NOEMP)	0.035 (0.20)	-0.398 (-1.22)	-0.038 (-0.17)	-0.077 (-0.28)
Industry Relatedness between US Firm & IJV (Rcode1)	-0.031 (-0.18)	0.008 (0.03)	0.101 (0.15)	-0.048 (-0.23)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.040 (-0.23)	-0.188 (-0.24)	-0.137 (-0.21)	0.238 (0.36)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.043 (-0.91)	0.066 (0.08)	0.026 (0.21)	-0.216 (-0.33)
F		1.10	2.42**	2.96**
Adj. R^2		0.0274	0.3272	0.4719
R^2		0.3053	0.5579	0.7133
ΔR^2			0.2526	0.1554
F-statistic for marginality test			6.5707	2.5746
p-value			0.0055	0.0709

† N=36 Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Table 8.17 Results of Hierarchical Regression Analysis: Machinery†

Dependent Variable: Productivity	Simple Regression	Step 1 (base model)	Step 2	Step 3 (complete model)
Intercepts	0	0	0	0
American Firm's R&D Intensity (RAD)	0.463 (2.67)**	0.410 (2.23)**	0.210 (1.10)	0.353 (0.32)
Japanese Firm's R&D Intensity (JRAD)	0.084 (0.43)	0.049 (0.23)	0.029 (0.13)	-0.786 (-0.18)
Dummy for Shared Ownership (O2)			0.179 (0.85)	0.288 (0.34)
Dummy for Majority Ownership (O3)			0.659 (2.36)**	0.189 (0.24)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity				-0.318 (-0.29)
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity				0.243 (0.21)
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity				0.883 (0.19)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity				0.596 (0.31)
American Firm's Number of Employees (EMP)	0.088 (0.45)	0.064 (0.27)	0.110 (0.51)	0.137 (0.55)
Japanese Firm's Sales (JSALE)	0.266 (1.40)	0.109 (0.51)	-0.084 (-0.39)	-0.035 (-0.14)
IJV Age (AGE)	0.373 (2.05)**	0.409 (1.64)*	0.341 (1.49)	0.374 (1.23)
The Percentage of Japanese Executives Hired by IJVs (JRAT)	0.334 (1.81)*	0.256 (1.23)	0.294 (1.54)	0.279 (1.05)
IJV's Number of Employees (NOEMP)	0.083 (0.43)	-0.200 (-0.67)	-0.489 (-1.61)*	-0.638 (-1.78)*
Industry Relatedness between US Firm & IJV (Rcode1)	-0.122 (-0.63)	0.089 (0.42)	-0.208 (-0.88)	-0.339 (-1.17)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.183 (-0.95)	-0.057 (-0.31)	0.113 (0.56)	0.140 (0.63)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.364 (-1.99)*	-0.231 (-1.08)	-0.060 (-0.29)	0.069 (0.28)
F		1.95*	2.43**	1.70
Adj. R^2		0.2598	0.3883	0.2933
R^2		0.5339	0.6602	0.7121
ΔR^2			0.1263	0.0519
F-statistic for marginality test			2.7877	0.4957
p-value			0.0935	0.7395

† N=28 Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Hypothesis H3d predicts that the American firm's number of employees is positively related to the IJV's productivity. The regression results based on the total sample indicate that in the complete model the coefficient for the American firm's number of employees is positive and significant at .05 level. However, such support is absent after we controlled the industry effect. For the complete model, our regression analyses based on the three different industries have generated insignificant regression coefficient for the American firm's number of employees. Therefore, our findings provide partial support for Hypothesis H3d.

Hypothesis H4d suggests that the Japanese firm's sales is positively related to the IJV's productivity. For the complete model, none of our regression analyses found the coefficient of the Japanese firm's sales to be significant. Therefore, Hypothesis H4d received no support from our findings.

Hypothesis H5b suggests that the IJV's number of employees is positively related to the IJV's productivity. Contrary to this prediction, our regression analysis based on the total sample found a negative and significant regression coefficient for the IJV's number of employees. Our regression analyses conducted over the three different industries indicate that in the complete model this coefficient is negative and insignificant. Therefore, Hypothesis H5b is rejected by our findings.

Hypothesis H6d states that older IJVs tend to have a higher level of productivity. The regression results based on the total sample indicate that in the complete model the coefficient for IJV age is positive and marginally significant at .1 level. However, such support is absent after we controlled the industry effect. For the complete model, our regression analyses based on the three different industries have generated positive and insignificant regression coefficient for IJV age. Therefore, our findings provide very weak support for Hypothesis H6d.

Hypothesis H7d suggests that as the IJV proportionally hires more local Japanese executives, there will be an improved productivity. The regression results based on the total sample indicate that in the complete model the coefficient for the percentage of local Japanese executives is positive and significant at .05 level.

However, such support disappears after we controlled the industry effect. For the complete model, the regression results based on the three different industries indicate that such coefficient is insignificant . Therefore, our analyses only provide partial support for Hypothesis H7d.

Finally, Hypothesis H8d predicts that the related IJV should have a higher level of productivity compared to the unrelated IJV. However, for the complete model, none of our regression analyses has generated significant regression coefficient for the three industry relatedness dummies. Therefore, our analyses provide no support for Hypothesis H8d.

Table 8.14 presents the goodness of fit index for the models estimated over the total sample. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives, the IJV's number of employees, and the three dummies for industry relatedness are entered into the equation, the R square is 0.1395, which means that the model can explain 13.95 percent variance in the IJV's productivity. The F statistic for the model is 2.92 and it is significant at .01 level. After the two ownership dummies are added to the equation, the R square changes to 0.2116. The F statistic is 3.98 and is significant at .001 level. Compared to the base model in step 1, the partial F-statistic with 2 and 178 degrees of freedom is 8.139. It is significant at .001 level, which implies that adding the two ownership dummies significantly improves the model's explanatory power. When the four interaction terms are entered, the R square is further increased to 0.2698, which implies that the model can explain 26.98 percent of variance in the IJV's productivity. The corresponding F statistic is 4.02, which is significant at .001 level. Compared to the model in step 2, the partial F-statistic with 4 and 174 degrees of freedom is 3.4676. It is significant at 0.01 level, which implies that the four interaction terms significantly increase the model's explanatory power.

Table 8.15 presents the goodness of fit index for the models estimated over the chemical and allied product industry. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives, the IJV's number of employees, and the three dummies for industry relatedness are entered into the equation, the F statistic for the model is 1.30 and it is insignificant, which implies that the model can not explain much variance in the IJV's productivity. After the two ownership dummies are added to the equation, the R square changes to 0.4320 and the F statistic changes to 3.42, which is significant at .001 level. Compared to the base model in step 1, the partial F-statistic with 2 and 54 degrees of freedom is 11.6033. It is significant at .0000 level, which implies that adding the two ownership dummies has add quite a lot of explanatory power to the model. When the four interaction terms are entered, the R square is further increased to 0.4806, which implies that the model can explain 48.06 percent of variance in the IJV's productivity. The corresponding F statistic is 2.89, which is significant at .01 level. Compared to the model in step 2, the partial F-statistic with 4 and 50 degrees of freedom is 1.1696. It is not significant, which implies that the four interaction terms do not add much explanatory power to the model.

Table 8.16 shows the goodness of fit index for the models estimated over the electrical and electronic equipment industry. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives, the IJV's number of employees, and the three dummies for industry relatedness are entered into the equation, the model's F statistic is 1.10 and is insignificant, which implies that this model can not explain much variance in the IJV's productivity. After the two ownership dummies are added to the equation, the R square changes to 0.5579 and the F statistic changes to 2.42, which is significant at .05 level. Compared to the base model in step 1, the partial F-statistic with 2 and 23 degrees of freedom is 6.5707. It is significant at .01 level, which implies that adding the two

ownership dummies significantly improves the model's explanatory power. When the four interaction terms are entered, the R square is further increased to 0.7133, which implies that the model can explain 71.33 percent of variance in the IJV's productivity. The corresponding F statistic is 2.96 and is significant at .05 level. Compared to the model in step 2, the partial F-statistic with 4 and 19 degrees of freedom is 2.5746. It is significant at .1 level, which implies that the four interaction terms significantly improve the model's explanatory power.

Table 8.17 shows the goodness of fit index for the models estimated over the machinery industry. According to this table, when the American firm's R&D intensity, the American firm's number of employees, the Japanese firm's R&D intensity, the Japanese firm's sales, IJV age, the percentage of Japanese executives, the IJV's number of employees, and the three dummies for industry relatedness are entered into the equation, the R square is 0.5339, which means that the model can explain 53.39 percent variance in the IJV's productivity. The F statistic for the model is 1.95 and it is significant at .1 level. After the two ownership dummies are added to the equation, the R square changes to 0.6602. The F statistic is 2.43 and is significant at .05 level. Compared to the base model in step 1, the partial F-statistic with 2 and 15 degrees of freedom is 2.7877. It is significant at .1 level, which implies that adding the two ownership dummies significantly improves the model's explanatory power. When the four interaction terms are entered, the R square is further increased to 0.7121, which implies that the model can explain 71.21 percent of variance in the IJV's revenue and profit. The corresponding F statistic is 1.70, which is insignificant. Compared to the model in step 2, the partial F-statistic with 4 and 11 degrees of freedom is 0.4957. It is not significant, which implies that the four interaction terms do not add much explanatory power to the model.

In summary, our regression analysis based on the total sample and the three different industries provide partial support for Hypothesis H1d, H3d, H6d and H7d. Our analysis rejected the prediction made by Hypothesis H5b and provide no support for Hypothesis H2d, H4d and H8d.

8.6. Contribution to the American Parent Firm's Value

The regression results regarding the IJV's contribution to the American firm's value are presented in Table 8.18. Hypothesis H1e states that the American firm's share of ownership and the American firm's intangible assets have a positive interaction effect on the American parent firms' value. Specifically, holding other variables constant, as the American firm's share of ownership increases, the marginal impact of the American firm's intangible assets on the American firm's Q also increases.

The regression results based on the chemical industry indicate that the regression coefficient for the interaction term between majority ownership and the American firm's R&D intensity is positive and significant at .1 level. The regression results based on the electrical and electronic equipment industry show that the regression coefficient for the interaction term between shared ownership and the American firm's R&D intensity is positive and significant at .1 level. However, such support is not evident from our regression analysis conducted over the total sample and over the machinery industry. Therefore, our findings provide partial support for Hypothesis H1e.

Table 8.18. Results of Hierarchical Regression Analysis †

Dependent Variable: Tobin's Q	Total Sample	Chemical	Electrical	Machinery
Intercepts	0	0	0	0
American Firms' R&D Intensity (RAD)	0.280 (1.04)	0.326 (1.01)	-0.132 (-0.19)	0.879 (0.81)
Dummy for Shared Ownership (O2)	-0.117 (-0.85)	-0.251 (-1.19)	-0.746 (-2.16)**	0.040 (0.06)
Dummy for Majority Ownership (O3)	-0.023 (-0.16)	-0.325 (-1.52)	0.103 (0.28)	0.058 (0.08)
Dummy for Shared Ownership (O2) X American Firms' R&D Intensity	-0.083 (-0.33)	0.197 (0.56)	1.160 (1.64)*	-0.878 (-0.80)
Dummy for Majority Ownership (O3) X American Firms' R&D Intensity	-0.227 (-0.87)	0.537 (1.73)*	-0.068 (-0.08)	-0.937 (-0.78)
Number of Observations	191	67	36	28
F	1.29	11.24****	6.22***	0.85
Adj. R^2	0.0075	0.4369	0.4271	-0.0278
R^2	0.0336	0.4796	0.5089	0.1625

† Standardized regression coefficients for the complete model are shown. t-values are presented in parentheses.
* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

For the model estimated over the total sample, the F statistic is 1.29. It is not significant, which implies that this model cannot explain much variance in the American firm's Q value. For the model estimated over the chemical and allied products industry, the F statistic is 11.24, which is significant at 0.0001 level. The R square is 0.4796, which means that this model can explain 47.96 percent of variance in the American firm's Q value. For the model estimated over the electrical and electronic equipment industry, the F statistic is 6.22, which is significant at 0.001 level. Its R square is 0.5089, which implies that the model can explain 50.89 percent of variance in the American firm's Q. For the model estimated over the machinery industry, the R square is 0.1625. Its adjusted R square value is –0.0278, which implies that this model can not explain much variance in the American firm's Q value and the high R square is caused by this index's sensitivity to the magnitudes of the number of observations and the number of independent variables in a small sample (Jobson, 1992a:227). This is consistent with this model's insignificant F statistic.

8.7. Hypothesis Testing: New IJV vs. Old IJV

According to the discussions in Section 6.3, there exist significant differences across the four age categories. Therefore, it is of interest to test our hypotheses over these different age categories. Table 8.19 reports the regression results regarding the IJV's growth in sales and productivity.

For Hypothesis H1a, the regression analysis conducted over the age category of 21-30 indicates that the regression coefficient for the interaction term between shared ownership and the American firm's R&D intensity is positive and significant at .1 level. The regression coefficient for the interaction term between majority ownership and the American firm's R&D intensity is positive and significant at .05 level. However, the regression analyses conducted over the other three age categories indicate that these coefficients are insignificant.

Table 8.19 Regression Coefficients: Complete Model †

Dependent Variable: Growth in Sales and Productivity	Total Sample	5-10	11-20	21-30	31-74
Intercepts	0	0	0	0	0
American Firm's R&D Intensity (RAD)	0.333 (1.79)*	1.497 (1.23)	0.171 (0.15)	0.091 (0.36)	0.416 (1.05)
Japanese Firm's R&D Intensity (JRAD)	-0.001 (-0.01)	0.138 (0.31)	0.094 (0.44)	0.059 (0.53)	0.287 (1.34)
Dummy for Shared Ownership (O2)	0.125 (1.16)	0.701 (1.09)	0.100 (0.40)	0.105 (0.56)	0.220 (0.67)
Dummy for Majority Ownership (O3)	0.063 (0.55)	0.094 (0.15)	0.377 (1.15)	0.101 (0.52)	-0.338 (-0.72)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity	0.220 (1.25)	-1.201 (-0.87)	0.345 (0.46)	0.459 (1.63)*	0.026 (0.07)
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity	0.406 (2.21)**	-0.514 (-0.41)	0.518 (0.44)	0.656 (2.82)***	0.501 (1.02)
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity	-0.076 (-0.95)	-0.240 (-0.49)	-0.146 (-0.65)	0.064 (0.41)	-0.003 (-0.01)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity	-0.147 (-1.73)*	-0.196 (-0.55)	-0.348 (-1.14)	-0.221 (-1.33)	0.079 (0.37)
American Firm's Number of Employees (EMP)	0.011 (0.19)	-0.043 (-0.22)	0.084 (0.66)	0.035 (0.37)	-0.035 (-0.21)
Japanese Firm's Sales (JSALE)	-0.074 (-1.33)	0.034 (0.18)	0.081 (0.69)	-0.193 (-1.93)*	-0.280 (1.34)
IJV Age (AGE)	-0.197 (-3.65)**	0.148 (0.92)	0.014 (0.10)	0.038 (0.42)	0.102 (0.39)
The Percentage of Japanese Executives Hired by IJVs (JRAT)	-0.045 (-0.84)	-0.111 (-0.75)	-0.237 (-2.10)**	0.157 (1.63)*	-0.120 (-0.77)
Industry Relatedness between US Firm & IJV (Rcode1)	0.017 (0.32)	-0.030 (-0.15)	0.150 (1.21)	-0.201 (-1.95)*	0.060 (0.31)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.055 (-0.89)	0.145 (0.43)	-0.017 (-0.15)	-0.108 (-1.06)	0.292 (0.86)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.001 (-0.01)	-0.143 (-0.42)	-0.067 (-0.55)	0.147 (1.50)	-0.538 (-1.54)
F	16.82****	2.00*	4.56****	6.13****	3.25***
Adj. R^2	0.5554	0.2679	0.4924	0.5659	0.5129
R^2	0.5905	0.5357	0.6309	0.6763	0.7412
Number of Observations	191	41	55	59	32

† Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

For Hypothesis H2a, our analyses conducted over the four age categories report no support. None of the regression coefficient for the two interaction terms between ownership dummies and the Japanese firm's R&D intensity is significant.

Contrary to Hypothesis H4a, the regression analysis conducted over the age category of 21-30 indicates that the coefficient for the Japanese firm's sales is negative and significant at .1 level. The regression analyses based on the other age categories indicate that this coefficient is insignificant.

For Hypothesis H6a, it is interesting to note that while the regression coefficient for IJV age is negative and significant according to the analysis conducted over the total sample, it is positive and insignificant according to the regression results from the four age categories.

For Hypothesis H7a, our regression analyses report mixed results. While the regression coefficient for the percentage of Japanese executives is positive and significant for the age category of 21-30. This coefficient is found to be negative and significant for the age category of 11-20..

Contrary to Hypothesis H8a, the regression analysis conducted over the age category of 21-30 reports a negative and significant coefficient for Rcode1, which denotes the industry relatedness between the IJV and its American parent firm.

In summary, our analyses based on the four age categories failed to find stronger support for our hypotheses regarding the IJV's growth in sales and productivity.

Table 8.20 reports the regression results regarding the IJV's revenue and profit. For Hypothesis H1b, the regression analysis conducted over the age category of 21-30 indicates that the regression coefficient for the interaction term between shared ownership and the American firm's R&D intensity is positive and significant at .1 level. However, the regression coefficients for the two interaction terms between

ownership dummies and the American firm's R&D intensity are not significant for the other three age categories.

Contrary to Hypothesis H2b, the regression result based on the age category of 21-30 reports that the regression coefficient for the interaction term between shared ownership and the Japanese firm's R&D intensity is positive and significant at .1 level. This might suggest that within this age category, the IJV's Japanese parent firm is willing to transfer more intangible assets if it shares the ownership with the American firm. The regression coefficients for the two interaction terms between ownership dummies and the Japanese firm's R&D intensity are not significant for the other three age categories.

For Hypothesis H4b, our analyses reported mixed results. While the regression coefficient for the Japanese firm's sales is positive and significant for the age category of 21-30. Our analysis based on the age category of 31-74 reports that this coefficient is negative and significant.

For Hypothesis H5a, the regression results based on the four age categories are consistent with the regression results from the total sample. The regression coefficient for the American firm's number of employees is positive and significant across the four different age categories.

Contrary to Hypothesis H8b, the regression analysis conducted over the age category of 11-20 reports a negative and significant coefficient for Rcode1, which denotes the industry relatedness between the IJV and its American parent firm. The regression analyses conducted over the age categories of 11-20 and 31-74 report a negative and significant coefficient for Rcode3, which denotes the industry relatedness between the IJV and its Japanese parent firm.

For Hypothesis H3b and Hypothesis H6b, our regression analyses based on the four age categories indicate that the regression coefficients for IJV age and the American firm's number of employees are insignificant.

Table 8.20 Regression Coefficients: Complete Model †

Dependent Variable: Revenue and Profit	Total Sample	5-10	11-20	21-30	31-74
Intercepts	0	0	0	0	0
American Firm's R&D Intensity (RAD)	-0.103 (-0.43)	-0.604 (-0.42)	0.009 (0.01)	-0.550 (-1.31)	-0.455 (-1.03)
Japanese Firm's R&D Intensity (JRAD)	-0.108 (-1.24)	0.284 (0.52)	0.152 (0.56)	-0.191 (-1.39)	-0.014 (-0.06)
Dummy for Shared Ownership (O2)	0.028 (0.20)	-0.404 (-0.53)	0.263 (0.81)	-0.454 (-1.96)*	0.464 (1.28)
Dummy for Majority Ownership (O3)	-0.140 (-0.95)	0.316 (0.43)	0.717 (1.63)*	-0.351 (-1.49)	0.118 (0.23)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity	0.115 (0.51)	0.789 (0.49)	-0.039 (-0.04)	0.657 (1.87)*	0.132 (0.31)
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity	0.163 (0.69)	0.007 (0.01)	-0.279 (-0.19)	0.401 (1.41)	0.056 (0.10)
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity	0.083 (0.81)	-0.188 (-0.31)	-0.137 (-0.47)	0.314 (1.67)*	-0.265 (-0.89)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity	0.085 (0.78)	-0.115 (-0.27)	-0.450 (-1.10)	0.125 (0.62)	-0.217 (-0.94)
American Firm's Number of Employees (EMP)	0.150 (2.02)**	-0.252 (-1.05)	-0.016 (-0.09)	0.050 (0.43)	0.123 (0.94)
Japanese Firm's Sales (JSALE)	0.029 (0.41)	-0.087 (-0.38)	0.334 (2.17)**	-0.000 (-0.00)	-0.441 (-1.87)*
IJV Age (AGE)	0.153 (2.01)**	-0.252 (-1.32)	-0.028 (-0.15)	0.067 (0.59)	0.113 (0.32)
The Percentage of Japanese Executives Hired by IJVs (JRAT)	-0.022 (-0.31)	-0.015 (-0.08)	-0.103 (-0.70)	0.110 (0.90)	-0.130 (-0.72)
IJV's Number of Employees (NOEMP)	0.384 (4.49)****	0.482 (2.44)**	0.385 (2.42)**	0.628 (4.88)****	0.468 (1.70)*
Industry Relatedness between US Firm & IJV (Rcode1)	0.093 (1.37)	-0.144 (-0.62)	-0.350 (-2.20)**	0.082 (0.65)	0.267 (1.29)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.113 (-1.42)	0.010 (0.02)	-0.194 (-1.27)	-0.051 (-0.41)	0.026 (0.07)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.105 (-1.34)*	0.092 (0.23)	0.273 (1.71)*	-0.186 (-1.53)	-0.679 (-1.69)*
F	5.43****	0.98	1.69*	3.02***	2.54**
Adj. R^2	0.2715	-0.0097	0.1681	0.3543	0.4343
R^2	0.3329	0.3843	0.4101	0.5294	0.7171
Number of Observations	191	41	55	59	32

† Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Based on the above discussions, we can hardly conclude that our analyses based on the four age categories provide stronger support for our hypotheses regarding the IJV's revenue and profit.

Table 8.21 reports the regression results regarding the IJV's growth in profit. According to this table, it seems that our analyses based on the four age categories fail to provide stronger support for the hypotheses regarding the IJV's growth in profit. None of these regressions' F statistic is significant.

Table 8.21 Regression Coefficients: Complete Model †

Dependent Variable: Growth in Profit	Total Sample	5-10	11-20	21-30	31-74
Intercepts	0	0	0	0	0
American Firm's R&D Intensity (RAD)	-0.416 (-1.52)	-2.078 (-1.48)	-0.891 (-0.52)	-0.089 (-0.24)	0.603 (0.96)
Japanese Firm's R&D Intensity (JRAD)	-0.100 (-1.00)	-0.172 (-0.33)	-0.098 (-0.32)	-0.249 (-1.55)	0.276 (0.82)
Dummy for Shared Ownership (O2)	-0.280 (-1.76)*	-0.696 (-0.94)	-0.147 (-0.71)	-0.202 (-0.74)	-0.134 (-0.26)
Dummy for Majority Ownership (O3)	-0.173 (-1.02)	-0.867 (-1.19)	-0.374 (-0.78)	0.002 (0.01)	0.116 (0.16)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity	0.376 (1.45)	2.233 (1.41)	0.422 (0.38)	0.133 (0.32)	-0.555 (-0.89)
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity	0.427 (1.58)*	2.297 (1.60)*	0.971 (0.57)	-0.051 (-0.15)	-0.155 (-0.20)
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity	-0.004 (0.81)	0.156 (0.28)	-0.046 (-0.14)	0.102 (0.45)	0.052 (0.12)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity	0.038 (0.30)	-0.021 (-0.05)	0.418 (0.95)	0.199 (0.82)	-0.140 (-0.41)
American Firm's Number of Employees (EMP)	0.045 (0.55)	0.159 (0.71)	0.135 (0.73)	0.127 (0.94)	-0.127 (-0.49)
Japanese Firm's Sales (JSALE)	0.017 (0.21)	0.001 (0.00)	-0.011 (-0.07)	-0.341 (-2.33)**	0.702 (2.07)*
IJV Age (AGE)	-0.254 (-3.20)***	-0.048 (-0.26)	-0.147 (-0.71)	-0.060 (-0.45)	-0.261 (-0.63)
The Percentage of Japanese Executives Hired by IJVs (JRAT)	0.082 (1.04)	0.225 (1.31)	-0.126 (-0.77)	-0.042 (-0.30)	-0.158 (-0.64)
Industry Relatedness between US Firm & IJV (Rcode1)	0.023 (0.30)	-0.561 (-2.47)**	0.022 (0.12)	0.149 (0.99)	-0.062 (-0.21)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	0.078 (0.85)	0.751 (1.93)*	0.201 (1.18)	-0.061 (-0.41)	-0.092 (-0.17)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.144 (-1.60)*	-0.830 (-2.14)**	-0.205 (-1.16)	-0.395 (-2.76)***	0.322 (0.58)
F	1.47	1.07	0.76	1.30	0.62
Adj. R^2	0.0355	0.0262	-0.0711	0.0706	-0.2150
R^2	0.1117	0.3825	0.2201	0.3069	0.3545
Number of Observations	191	41	55	59	32

† Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Table 8.22 reports the regression results regarding the IJV's productivity. According to this table, the only significant regression coefficient is the coefficient for the percentage of Japanese executives, which is reported by our regression analysis conducted over the age category of 5-10. Even for this coefficient, it is less significant than the one estimated over the total sample. Therefore, we can conclude that our regression analyses conducted over the four age categories fail to provide any stronger support for hypotheses regarding the IJV's productivity.

Table 8.22 Regression Coefficients: Complete Model †

Dependent Variable: Productivity	Total Sample	5-10	11-20	21-30	31-74
Intercepts	0	0	0	0	0
American Firm's R&D Intensity (RAD)	0.062 (0.24)	-0.224 (-0.15)	-0.486 (-0.47)	0.106 (0.26)	-0.598 (-0.96)
Japanese Firm's R&D Intensity (JRAD)	-0.022 (-0.24)	-0.107 (-0.19)	0.024 (0.13)	-0.007 (-0.04)	-0.385 (-1.14)
Dummy for Shared Ownership (O2)	0.010 (0.07)	0.118 (0.15)	-0.133 (-0.59)	-0.028 (-0.74)	-0.621 (-1.22)
Dummy for Majority Ownership (O3)	0.008 (0.05)	-0.216 (-0.28)	-0.014 (-0.05)	0.175 (0.59)	-1.011 (-1.40)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity	-0.087 (-0.37)	0.201 (0.12)	0.296 (0.44)	-0.141 (-0.32)	0.365 (0.60)
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity	0.404 (1.63)*	0.733 (0.49)	1.344 (1.29)	0.274 (0.77)	1.071 (1.43)
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity	0.054 (0.50)	0.109 (0.18)	0.056 (0.27)	-0.050 (-0.45)	0.370 (0.88)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity	0.005 (0.04)	0.220 (0.51)	-0.115 (-0.41)	-0.256 (-1.01)	0.228 (0.70)
American Firm's Number of Employees (EMP)	0.175 (2.26)**	0.360 (1.46)	-0.054 (-0.47)	0.121 (0.83)	0.366 (1.38)
Japanese Firm's Sales (JSALE)	0.072 (0.96)	0.101 (0.43)	-0.126 (-1.19)	0.139 (0.90)	-0.095 (-0.28)
IJV Age (AGE)	0.127 (1.59)*	0.157 (0.79)	0.057 (0.45)	0.054 (0.38)	0.695 (1.39)
The Percentage of Japanese Executives Hired by IJVs (JRAT)	0.171 (2.26)**	0.326 (1.71)*	0.119 (1.16)	0.162 (1.06)	0.087 (0.34)
IJV's Number of Employees (NOEMP)	-0.169 (-1.88)*	-0.236 (-1.16)	-0.007 (-0.07)	-0.166 (-1.03)	-0.278 (-0.71)
Industry Relatedness between US Firm & IJV (Rcode1)	0.089 (1.26)	0.146 (0.60)	0.030 (0.27)	0.232 (1.46)	-0.255 (-0.87)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	0.059 (0.71)	0.187 (0.46)	0.056 (0.53)	0.066 (0.42)	0.519 (0.45)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	0.014 (0.18)	-0.125 (-0.31)	0.028 (0.25)	0.036 (0.24)	-0.128 (-0.43)
F	4.02****	0.83	6.18****	0.94	0.77
Adj. R^2	0.2026	-0.0719	0.6011	-0.0177	-0.1269
R^2	0.2698	0.3464	0.7171	0.2583	0.4365
Number of Observations	191	41	55	59	32

† Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

8.8. The IJV's Return on Capital and Growth in Taxable Income

According to the discussions in Section 7.1, the factor analysis results indicate that the IJV's return on capital and the IJV's growth in taxable income have very low communalities. This suggests that these two variables are unrelated to the four factors, which implies that these two variables might represent distinct dimensions. It is, therefore, of interest to examine that if there is a positive interaction effect between the American firm's intangible assets and the American firm's share of ownership on these two variables. To test this, we conducted separate regression analyses over the total sample and three different industries.

Table 8.23 presents the regression results regarding the IJV's return On capital. According to this table, our regression analyses conducted over the total sample, the chemical and allied products industry, and the electrical and electronic equipment industry have generated insignificant regression coefficients for the two interaction terms between the American firm's intangible assets and the American firm's share of ownership. For the model estimated over the machinery industry, the regression coefficients of the two interaction terms are negative and significant at .1 level. However, this model's F statistic is 1.72 and is insignificant, which implies that this model does not have much explanatory power. Therefore, our analyses based on the total sample and the three different industries failed to find any support for a positive interaction effect between the American firm's intangible assets and the American firm's share of ownership on the IJV's return on capital.

Table 8.23 Regression Coefficients: Complete Model †

Dependent Variable: Return on Capital	Total Sample	Chemical	Electrical	Machinery
Intercepts	0	0	0	0
American Firm's R&D Intensity (RAD)	0.266 (0.99)	0.572 (1.03)	-0.382 (-0.36)	1.948 (1.77)*
Japanese Firm's R&D Intensity (JRAD)	0.035 (0.36)	0.176 (0.47)	-0.023 (-0.09)	-3.320 (-0.74)
Dummy for Shared Ownership (O2)	-0.017 (-0.11)	0.575 (1.02)	-0.958 (-1.53)	0.560 (0.67)
Dummy for Majority Ownership (O3)	0.140 (0.85)	0.105 (0.20)	-0.059 (-0.10)	0.409 (0.52)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity	-0.006 (-0.02)	-0.561 (-0.96)	1.073 (1.03)	-1.911 (-1.76)*
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity	-0.417 (-1.59)	-0.195 (-0.40)	0.101 (0.09)	-2.413 (-2.06)*
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity	-0.081 (-0.71)	-0.308 (-0.63)	0.315 (1.22)	3.298 (0.71)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity	0.056 (0.46)	-0.172 (-0.34)	-0.049 (-0.19)	1.545 (0.80)
American Firm's Number of Employees (EMP)	-0.126 (-1.51)	0.039 (0.27)	-0.353 (-1.15)	-0.066 (-0.27)
Japanese Firm's Sales (JSALE)	-0.026 (-0.33)	-0.100 (-0.64)	-0.164 (-0.86)	0.199 (0.78)
IJV Age (AGE)	-0.097 (-1.15)	-0.304 (-1.90)*	-0.016 (-0.08)	-0.541 (-1.79)*
The Percentage of Japanese Executives Hired by IJVs (JRAT)	-0.103 (-1.28)	-0.105 (-0.70)	-0.044 (-0.23)	0.239 (0.90)
IJV's Number of Employees (NOEMP)	-0.135 (-1.41)	-0.153 (-0.86)	-0.103 (-0.34)	-0.073 (-0.20)
Industry Relatedness between US Firm & IJV (Rcode1)	0.052 (0.69)	0.042 (0.24)	-0.040 (-0.17)	0.409 (1.42)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.037 (-0.42)	-0.136 (-0.77)	0.490 (0.66)	-0.119 (-0.54)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	-0.111 (-1.28)	-0.050 (-0.32)	-0.595 (-0.81)	-0.246 (-1.01)
F	2.37***	0.82	2.08*	1.72
Adj. R^2	0.1037	-0.0451	0.3299	0.2990
R^2	0.1796	0.2122	0.6362	0.7144
Number of Observations	191	67	36	28

† Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Table 8.24 presents the regression results regarding the IJV's growth in taxable income. Our regression results based on the total sample and the electrical and electronic equipment industry indicate that the regression coefficients for the two interaction terms between the American firm's intangible assets and the American firm's share of ownership are negative and significant at .001 level. However, the regression results based on the chemical and allied products industry as well as the machinery industry show that these two coefficients are not significant. Therefore, our analyses based on the total sample and the three different industries do not provide support for a positive interaction effect between the American firm's intangible assets and the American firm's share of ownership on the IJV's return on capital.

In terms of the American firm's R&D intensity, the regression results based on the total sample and the chemical and the allied products industry indicate a positive and significant coefficient. However, our analyses based on the machinery industry and the electrical and electronic equipment industry found this coefficient to be insignificant. The same is true with the two ownership dummies. While our analyses based on the total sample and the chemical and the allied products industry show that the coefficients for the two ownership dummies are positive and significant, our analyses based on the machinery industry and the electrical and electronic equipment industry found these two coefficients to be insignificant.

In terms of the control variables, our analysis based on the machinery industry shows that the regression coefficient for the American firm's number of employees and the regression coefficient for the Japanese firm's sales is negative and significant.

Table 8.24 Regression Coefficients: Complete Model †

Dependent Variable: Growth in Taxable Income	Total Sample	Chemical	Electrical	Machinery
Intercepts	0	0	0	0
American Firm's R&D Intensity (RAD)	1.067 (3.86)****	-0.555 (-1.00)	5.733 (6.58)****	0.110 (0.12)
Japanese Firm's R&D Intensity (JRAD)	0.052 (0.52)	-0.254 (-0.69)	0.207 (0.99)	4.150 (1.09)
Dummy for Shared Ownership (O2)	0.299 (1.88)*	-0.540 (-0.96)	2.223 (4.28)****	0.229 (0.32)
Dummy for Majority Ownership (O3)	0.352 (2.09)**	0.017 (0.03)	2.041 (4.04)****	0.267 (0.40)
Dummy for Shared Ownership (O2) X American Firm's R&D Intensity	-0.931 (-3.58)****	0.645 (1.12)	-5.551 (-6.41)****	-0.279 (-0.30)
Dummy for Majority Ownership (O3) X American Firm's R&D Intensity	-1.072 (-3.96)****	0.018 (0.04)	-6.223 (-6.43)****	0.087 (0.09)
Dummy for Shared Ownership (O2) X Japanese Firm's R&D Intensity	-0.047 (-0.40)	0.189 (0.39)	-0.211 (-0.98)	-4.623 (-1.17)
Dummy for Majority Ownership (O3) X Japanese Firm's R&D Intensity	0.015 (0.12)	0.347 (0.70)	-0.114 (-0.52)	-2.320 (-1.41)
American Firm's Number of Employees (EMP)	-0.009 (-0.11)	-0.001 (-0.00)	0.002 (0.01)	-0.588 (-2.78)**
Japanese Firm's Sales (JSALE)	0.098 (1.19)	0.083 (0.53)	-0.029 (-0.18)	-0.701 (-3.25)***
IJV Age (AGE)	0.016 (0.18)	0.045 (0.28)	-0.055 (-0.34)	0.755 (2.94)**
The Percentage of Japanese Executives Hired by IJVs (JRAT)	0.112 (1.36)	0.146 (0.98)	-0.121 (-0.75)	-0.236 (-1.05)
IJV's Number of Employees (NOEMP)	-0.028 (-0.28)	0.113 (0.64)	-0.007 (-0.03)	-0.407 (-1.34)
Industry Relatedness between US Firm & IJV (Rcode1)	0.106 (1.36)	0.210 (1.18)	0.009 (0.04)	-0.022 (-0.09)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.087 (-0.96)	-0.281 (-1.61)	-1.378 (-2.23)**	0.122 (0.65)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	0.117 (1.31)	0.221 (1.42)	1.417 (2.33)**	-0.448 (-2.16)*
F	1.57*	0.89	3.57***	2.65*
Adj. R^2	0.0459	-0.0272	0.5401	0.4946
R^2	0.1267	0.2256	0.7503	0.7941
Number of Observations	191	67	36	28

† Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

The regression coefficient for the IJV age is positive and significant at .05 level. Our analysis based on the electrical and electronic equipment industry indicates a negative and significant regression coefficient for the dummy that denotes the industry relatedness between the American firm and its Japanese partner. In addition, while our analysis based on the electrical and electronic equipment industry shows a positive and significant regression coefficient for the dummy which denotes the industry relatedness between the IJV and its Japanese parent, our analysis based on the machinery industry found this coefficient to be negative and significant at .1 level.

In summary, the regression analysis based on the total sample provides partial supports for the hypothesis that there is a positive interaction effect between the American firm's intangible assets and the American firm's share of ownership on the IJV's growth in sales and productivity and the IJV's productivity. However, such support disappears after controlling for the industry effect.

Our regression analyses over the total sample and the three different industries provide partial support for the hypothesis that there is a positive interaction effect between the American firm's intangible assets and the American firm's share of ownership on the IJV's rate of growth in profit. However, our analyses fail to provide support for the hypothesis that there is a positive interaction effect between the American firm's intangible assets and the American firm's share of ownership the IJV's revenue and profit.

Our regression analysis over the total sample provide partial support for the hypothesis that there is a negative interaction effect between the Japanese firm's intangible assets and the American firm's share of ownership on the IJV's growth in sales and productivity. But, neither the test over the total sample nor the tests over the three different industries provide support for the hypotheses that there is a negative interaction effect between the Japanese firm's intangible assets and the American firm's share of ownership on the IJV's productivity, the IJV's growth in profit, and the IJV's revenue and profit.

Our analyses over the total sample and the three different industries provide partial support for Hypothesis H1e, which states that there is a positive interaction effect between the American firm's intangible assets and the American firm's share of ownership on the American firm's Q value.

The regression results presented in Section 8.7 suggest that our analyses based on the four age categories failed to provide stronger supports for our hypotheses regarding the IJV's growth in sales and productivity, the IJV's revenue and profit, the IJV's growth in profit, and the IJV's productivity.

Finally, our analyses based on the total sample and the three different industries failed to find support for a positive interaction effect between the American firm's intangible assets and the American firm's share of ownership on the IJV's return on capital and the IJV's growth in taxable income.

Chapter IX

Discussion and Conclusion

9.1 Discussions

9.1.1 The Interaction Effect

The interaction effect between the American firm's R&D intensity and the American firm's share of ownership on the IJV's performance has been the focus of this study. Among the four dimensions of IJV performance, our findings based on the total sample provide partial support for the hypotheses regarding the positive interaction effect between the American firm's R&D intensity and American firm's share of ownership on the IJV's productivity and the IJV's growth in sales and productivity. Our findings reveal that the interaction effect between the American firm's R&D intensity and the dummy for majority ownership on the IJV's productivity and the IJV's growth in sales and productivity is significant and is in the right direction. The interaction effect between the American firm's R&D intensity and the dummy for shared ownership on the IJV's productivity and the IJV's growth in sales and productivity, however, is insignificant. This implies that, compared to the American firm's minority ownership position, when the American firm and the Japanese firm have equal share of the IJV's ownership, increases in American firm's R&D intensity does not significantly improve the IJV's productivity and the IJV's rate of growth in sales and productivity. This finding seems to be not consistent with Hypothesis H1a and H1d. It may breach our theoretical notion that, compared to the American firm's minority ownership position, when the American firm has equal shares of the IJV's ownership, the American firm is more willing to transfer its intangible assets to the IJV, and therefore the IJV will perform better. How could it happen that increased transfer of intangible assets is not accompanied with significant

improvement in the IJV's productivity and in the IJV's rate of growth in sales and productivity. This is a puzzle worth further elaboration.

In Chapter 3, we mentioned that the major risk the American firm faces in the IJV is associated with the possibility of leaking its intangible assets and core capabilities to its Japanese partner (Buckley & Casson, 1988; Hennart, 1991; Wolf, 1995). According to TCA, the American firm needs to acquire sufficient control and ownership in order to protect its intangible assets from leaking to its local partner. The more ownership and control the American firm acquires, the less the risk that its intangible assets will be disseminated to its local partner and the more it is willing to transfer its intangible assets. Hence, *ceteris paribus*, the more ownership the American firm acquires, the more intangible assets it will transfer to the IJV in Japan, and the better the IJV's performance will be. Therefore, we propose a positive interaction effect between the American firm's share of ownership and the American firm's intangible assets on the IJV's performance. It should be noted that we derived this notion of positive interaction between the American firm's share of ownership and the American firm's intangible assets on the IJV's performance from the single perspective of avoiding the risk of leaking valuable intangible assets to the local Japanese partner. However, previous studies suggest that the factor of ownership may affect IJV performance through other mechanisms. For instance, Killing (1982, 1983) asserted that the dominant controlled IJV was more likely to be successful than the shared IJV. His argument was that the presence of two (or more) parents constituted the major source of management difficulties in the IJV. The dominant controlled IJV, in which the venture's activities are dominated by a single firm, would be easier to manage and tended to be more successful. Whereas, in case of the 50/50 IJV, no one parent firm has dominant control and the IJV was more likely to have difficulties in coordinating and in the day-to-day operations when cultural differences were present. We expect that in the shared IJV, the American parent firm with higher R&D intensities will have more difficulties in coordinating and in the day-to-day operations. As demonstrated by Table 8.1 and Table 8.4, the American firm's intangible assets is the major source of

the IJV's higher productivity and the IJV's higher rate of growth in sales and productivity. Whereas, the contribution from the Japanese firm is not significant. This finding is consistent with the notion that the American firm tends to contribute more heavily in the areas of technology (product design, manufacturing know-how, special equipment) and global support (technical, marketing, and maintenance services) than the local Japanese partner (Nakamura & Yeung, 1994; Kang, 1990; Kudo, 1994). It is natural that the American firm with more contributions will demand more say in the day-to-day operations. However, the arrangement of shared ownership prevents it from doing so. Consequently, it is more difficult to coordinate and more conflict will emerge in the shared IJV in which the American parent firm has a higher R&D intensity. Conflict will surely prevent significant improvement in the IJV's productivity and the IJV's growth in sales and productivity.

Another possible explanation is that, compared to minority ownership, when the American firm acquires shared ownership, it will have more control and face reduced risk of leaking its intangible assets and core capabilities to their Japanese partner. However, compared to majority ownership, it may perceive that such increase in its ownership and control is still not sufficient to protect their intangible assets and core capabilities. With this concern, it may not be willing to significantly increase the transfer of its intangible assets. Consequently, we can only detect insignificant improvement in the IJV's productivity and the IJV's growth in sales and productivity.

9.1.2 The Industry Effect.

In Chapter 8, we noticed that the regression analyses based on the total sample provide partial supports for the positive interaction effects between the American firm's R&D intensity and the American firm's share of ownership on the IJV's productivity and the IJV's growth in sales and productivity. Nevertheless, such supports often disappear when we run separate regression analyses over the three different industries. One might suspect that the positive interaction effect, as evidenced

in the regression analyses over the total sample, is the result of industry effect. However, before we jump too quickly to this conclusion, it is worthwhile to examine what we really mean by industry effect.

In Chapter 4, we mentioned that industry effect take place in the forms of Porter's (1980) five forces of competition, or in the forms of product differentiation, technical capacity, skill intensity, capital requirements, and scale economies. It is far beyond this study's scope to measure and control these differences among different industries. However, the results of the discriminant analysis reveal that, among the three different industries, there is no significant difference in the IJV's size and in the Japanese parent firm's size. This might reflect the fact that in this case scale economy might not play a role in terms of industry effect. Further, the discriminant analysis indicates that among the three different industries, there are significant differences in the American firm's R&D intensity and in the American firm's share of ownership. Considering these factors, one possible scenario is that the differences in the American firm's R&D intensity and the American firm's share of ownership are the major industry factor which constitute the industry difference and as well serve as the major driving force behind the different levels of IJV performance. This implies that other industry factors do not play a significant role in affecting the IJV's performance. If this is case, then the American firm's concerns over protecting intangible assets prevail over other industry differences, and the supports for our hypotheses will hold despite the industry effect.

Table 9.1. Summary of Item Means by Industry Group with ANOVA Statistics

Variables	Group Means				F	p-Value
	Chemical	Electric	Machinery	Other		
Ownership	0.509	0.531	0.514	0.465	2.9	0.036
US. Firms' R&D Intensity	0.039	0.065	0.035	0.018	19.54	0.000
IJV's No. of Employees	2.127	2.36	2.194	2.388	1.81	0.147
US. Firms' No. of Employees	1.432	1.147	1.058	1.527	4.28	0.006
Jap. Firms' Sale	8.534	8.525	8.54	8.664	0.53	0.664

Further, in our study, the support for the interaction effect between the American firm's R&D intensity and the American firm's share of ownership is plagued by the lower level of variances within the industries. According to the MANOVA results, the industry groups are significantly different from each other, which implies that the among industry variance is much larger than the within industry variance. The low within industry variation will hinder the statistical power of the regression analyses conducted over the three different industries. Even though the regression analysis can reveal a significant relationship over the total sample, such relationships will disappear in the regression analyses conducted over the sub-samples because of the small within industry variance. To improve the statistical power of this study, a larger sample with a fair level of within industry variation is necessary for future studies.

Considering the above discussions, further investigation into the industry effects and a larger sample is necessary before we reject our hypotheses regarding the interaction effect between the American firm's R&D intensity and the American firm's share of ownership. Therefore, our conclusion with respect to the interaction effect is inconclusive.

9.1.3 The Age Effect.

In Section 8.6, we conducted separate regression analyses over the four different age categories. The regression results indicate that, compared to the analyses conducted over the total sample, these analyses fail to reveal any stronger support for our hypotheses. For instance, according to Table 8.18, our regression results from the total sample show that, consistent with Hypothesis H6a, the regression coefficient for IJV age is negative and significant at .01 level. However, when we conduct separate regression analyses over the four different age categories, this coefficient becomes positive and insignificant. To explain this, we did a MANOVA test for the four age categories. The MANOVA yielded a Wilk's Lambda of 0.075 with an F-statistic of

20.23. Comparison of this F-statistic to the F distribution with 36 and 520.74 degrees of freedom yields a p-value of 0.0001. This implies that the among group variances are much larger than the within group variances. Because of the small within group variances, the regression analyses conducted over the four age categories have generated insignificant regression coefficient, despite that, overall, the IJV's growth in sales and productivity is significantly related to IJV age. This phenomenon can easily be illustrated by an age-growth in sales and productivity plot as presented in Figure 9.1.

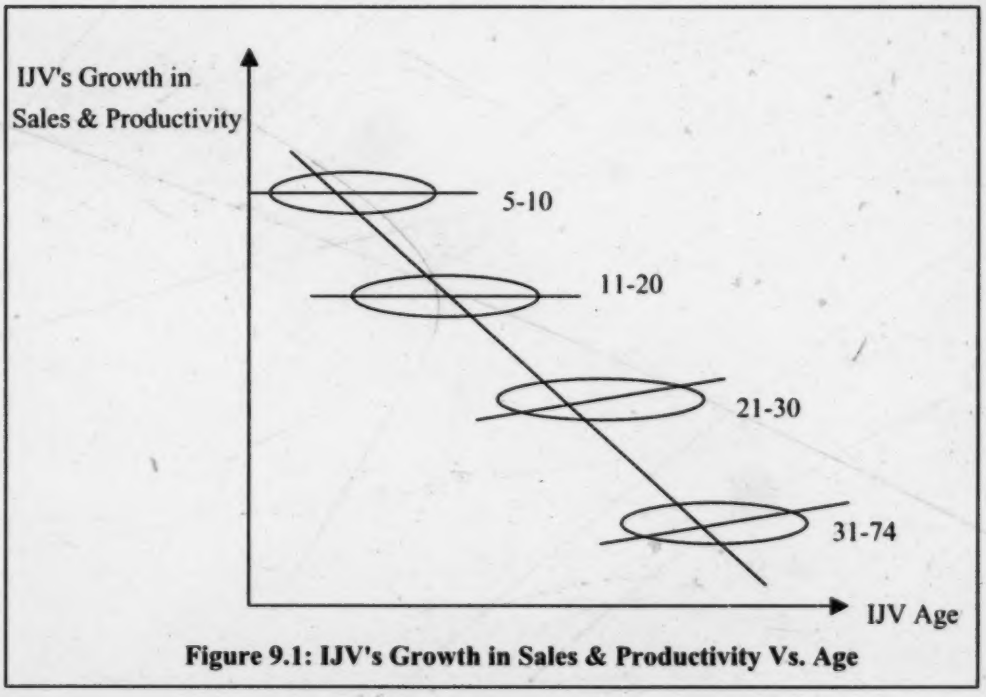


Figure 9.1: IJV's Growth in Sales & Productivity Vs. Age

9.1.4 The American Firm's R&D Intensity vs. the IJV's Performance

In our regression analyses, one common feature is that adding the ownership dummies and the interaction terms between ownership dummy and the American firm's R&D intensity often adds no significant explanatory power to the model. This

prompts us to examine the base models in which the ownership dummies and the interaction terms are not added. Particularly, it is of interest for us to examine the relationship between the American firm's R&D intensity and the IJV's performance. Among the four dimensions of the IJV's performance, the American firm's R&D intensity is found to have no significant relationship with the IJV's growth in profit and the IJV's revenue and profit. The regression analyses, however, find consistent support for the positive relationship between the American firm's R&D intensity, the IJV's growth in sales and productivity, and the IJV's productivity. For instance, with respect to the IJV's growth in sales and productivity, Table 9.2 indicates that in the base model estimated over the total sample, the regression coefficient for the American firm's R&D intensity is positive and significant at .001 level. After controlling for the industry effect, such a relationship still prevails in regression results from the three different industries. With respect to the IJV's productivity, Table 9.3 shows that in the base model estimated over the total sample, the regression coefficient for the American firm's R&D intensity is positive and significant at .05 level. After controlling for the industry effect, such a relationship is still significant in regression results from two industries. These consistent results indicate that the American parent firm's intangible assets is the major driving force behind the IJV's superior performance. These findings have the potential to enrich our understanding about the FDI theories. For instance, the internalization theory predicts that the firm's intangible assets is the major driving force behind FDI activities (Coase, 1937; Caves, 1971; Dunning, 1973; Buckley & Casson, 1976; Hennart, 1982). Morck and Yeung (1991) further indicate that the parent firm's intangible assets is an essential condition for FDI to add value to investing firms. Our finding extended this avenue of research by indicating that a higher level of the parent firm's intangible assets will also lead to the superior performance for its overseas subsidiaries.

Table 9.2: Results of Hierarchical Regression Analysis: Base Models†

Dependent Variable: Growth in Sales and Productivity	Total Sample	Chemical	Electrical	Machinery
Intercepts	0	0	0	0
American Firm's R&D Intensity (RAD)	0.653 (12.57)****	0.674 (6.02)****	0.508 (3.33)****	0.859 (5.81)****
Japanese Firm's R&D Intensity (JRAD)	-0.078 (-1.45)	-0.032 (-0.29)	-0.056 (-0.36)	-0.073 (-0.42)
American Firm's Number of Employees (EMP)	-0.018 (-0.34)	0.025 (0.24)	-0.115 (-0.56)	0.003 (0.02)
Japanese Firm's Sales (JSALE)	-0.050 (-0.91)	0.037 (0.33)	0.092 (0.61)	0.050 (0.29)
IJV Age (AGE)	-0.216 (-3.95)****	-0.031 (-0.28)	-0.321 (-2.19)**	-0.071 (-0.41)
The Percentage of Japanese Executives Hired by IJVs (JRAT)	-0.058 (-1.07)	-0.161 (-1.49)	-0.058 (-0.42)	-0.074 (-0.44)
Industry Relatedness between US Firm & IJV (Rcode1)	0.039 (0.74)	0.011 (0.09)	-0.004 (-0.02)	0.130 (0.80)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	-0.078 (-1.25)	-0.027 (-0.22)	0.263 (0.47)	-0.005 (-0.04)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	0.014 (0.22)	0.068 (0.60)	-0.279 (-0.51)	0.136 (0.82)
Adj. R^2	0.5284	0.3787	0.4807	0.5163
R^2	0.5507	0.4634	0.6143	0.6776

† Standardized regression coefficients are shown. t-values are presented in parentheses.

* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

Table 9.3: Results of Hierarchical Regression Analysis: Base Models†

Dependent Variable: Productivity	Total Sample	Chemical	Electrical	Machinery
Intercepts	0	0	0	0
American Firm's R&D Intensity (RAD)	0.256 (3.47)****	0.002 (0.01)	0.563 (2.54)**	0.410 (2.23)**
Japanese Firm's R&D Intensity (JRAD)	-0.006 (-0.08)	0.025 (0.18)	0.040 (0.19)	0.049 (0.23)
American Firm's Number of Employees (EMP)	0.188 (2.34)**	0.220 (1.71)*	0.286 (0.83)	0.064 (0.27)
Japanese Firm's Sales (JSALE)	0.131 (1.70)*	-0.098 (-0.69)	0.199 (0.97)	0.109 (0.51)
IJV Age (AGE)	0.103 (1.22)	-0.004 (-0.03)	0.278 (1.27)	0.409 (1.64)*
The Percentage of Japanese Executives Hired by IJVs (JRAT)	0.179 (2.25)**	0.096 (0.69)	0.190 (0.91)	0.256 (1.23)
IJVs' Number of Employees (NOEMP)	-0.179 (-1.90)*	0.040 (0.26)	-0.398 (-1.22)	-0.200 (-0.67)
Industry Relatedness between US Firm & IJV (Rcode1)	0.132 (1.76)*	0.402 (2.62)**	0.008 (0.03)	0.089 (0.42)
Industry Relatedness between US Firm & Jap. Firm (Rcode2)	0.003 (0.03)	-0.132 (-0.86)	-0.188 (-0.24)	-0.057 (-0.31)
Industry Relatedness between Jap. Firm & IJV (Rcode3)	0.002 (0.03)	-0.079 (-0.56)	0.067 (0.08)	-0.231 (-1.08)
Adj. R^2	0.0917	0.0428	0.0274	0.2598
R^2	0.1395	0.1879	0.3053	0.5339

† Standardized regression coefficients are shown.
* $p < .10$ ** $p < .05$ *** $p < .01$ **** $p < .001$

9.1.5 IJV's Contribution to the American Firm's Value

Hypothesis H1e concerns the IJV's contribution to the American firm's value. The result of our analyses provides partial support for Hypothesis H1e. The regression results from the chemical and allied products industry indicate that the coefficient for the interaction term between the majority ownership dummy and the American firm's R&D intensity is positive and significant at .1 level. The regression results from the electrical and electronic equipment industry show that the coefficient for the interaction term between the shared ownership dummy and the American firm's R&D intensity is positive and significant at .1 level. However, Hypothesis H1e received no support from our tests over the total sample and the machinery industry. Considering that the American firm's R&D intensity is higher for the chemical and allied products industry and the electrical and electronic equipment industry, it seems that in these two industries the American firm is more sensitive to the protection of its intangible assets.

Further, since the IJV's sales volume, on average, is only 3.54 percent of the American parent firm's sales volume, the relatively weak support is intuitively correct since no matter how superior the IJV is performing, its contribution to the American parent firm's value should be limited.

9.2 Limitations and Suggestions for Future Research

This study has three major limitations. First, it seems that our sample obviously deviates from the normal distribution. The skewness and kurtosis index of several variables are very large. As a preliminary remedy, we conducted log and square root transformation on some variables in order to achieve normal distribution. However, this cannot solve all the problems. Variables such as R&D intensity, the two dummy variables for ownership, their corresponding slope shifters are intrinsically not normally distributed, and transformation may not solve the problem satisfactorily. In

this study, we used SAS and multivariate regression analysis to test our hypotheses. In SAS, the multivariate regression analysis use the principle of ordinary least squares to produce the estimates. Since the ordinary least squares estimator and the generalized least square estimator are equivalent for the multivariate regression model (Jobson, 1992b:180) and the generalized least square estimator is robust against deviations from normal distribution (Jöreskog & Sörbom, 1989), this provides a partial solution to the problem. Nevertheless, our interpretation of the findings is still constrained.

Second, as we discussed in Section 9.1.2, in this study, we do not try to measure all the industry differences. This makes it difficult to interpret our regression results and further investigation into the industry effects is essential before we make any conclusions regarding the interaction effect between the American firm's R&D intensity and the American firm's share of ownership.

Finally, in this study, we try to measure industry relatedness by examine the IJV's and its parent firm's industry categorization and the overlap in these firms' list of products. However, such an approach, and the diversification study in general, suffers from two serious limitations (Markides & Williamson, 1996). First, such an approach is unable to identify instances in which the strategic assets (Barney, 1991)- those that offer important sources of long-run competitive advantage- are common across two businesses (Markides & Williamson, 1996). For instance, based on this approach, British Steel, which only makes steel, will be categorized as a company competing in related business. However, according to a senior executive at British Steel, the several different types of steel that the company produces have such different buying characteristics and requirements and British Steel could be viewed as company competing in a series of unrelated businesses. By contrast, the Citizen Watch Company Ltd., whose products include watches, printers for personal computers, floppy disk drives, notebook computers, LCD TVs, quartz oscillators, precision

machine tools and robots, should be defined as a company competing in unrelated business. However, Citizen's president claims that Citizen's diversified products share a common set of advanced, precision technology that the company developed in the course of manufacturing watches and thus Citizen should be viewed as a company competing in related businesses (Nakajine, 1995). Further, this approach do not consider whether the skills, resources, assets, or competencies being shared could be obtained at an equivalent or even lower cost by nondiversifiers (Barney, 1991; Farjoun, 1994; Montgomery & Hariharan, 1991). For instance, the business of color TV and the business of computer monitor should be classified as related since they share the similar manufacturing technique. However, we could not expect a firm that is diversified across these markets to have any superior performance since such technique could easily be purchased from a competitive market.

Because of these methodological problems, our analyses have generated mixed result for the relationship between industry relatedness and the IJV's performance. While such relationship is proved to be positive and significant on a few occasions, most of the time, it is found to be insignificant, or even negative. In order to achieve a valid test result for this relationship, we must first develop a better measure for industry relatedness.

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